Addendum #5 Specifications

For

710 WILSHIRE BOULEVARD

Santa Monica, CA 90401

May 27, 2016

VOLUME 1 OF 2

Project #0000000

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DOCUMENT 000110

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NOT USED

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NOT USED

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GENERAL REQUIREMENTS

SECTION 011000

SUMMARY

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. Work of this Contract Comprises Construction of seven-levels of hotel rooms above concrete podium level and five-levels below grade parking garage.

B. Exterior finishes include:
   1. 3-coat plaster system.
   2. Cast-in-Place Concrete.
   3. Single ply roofing.
   4. Aluminum glazing systems at hotel rooms.
   5. Aluminum storefronts at podium.

C. Work consists of providing labor, materials, equipment, services, and administration required in conjunction with or properly incidental to Project construction.

1.2 CONSTRUCTION CONTRACT

A. Construct Project under Lump Sum Price contract.

1.3 SUSTAINABLE DESIGN & CONSTRUCTION

A. This Project is a registered U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design, LEED® project. Refer to Section 018113 for required prerequisites and credits for the Project to obtain the required LEED Rating.

B. Environmental Goals:
   1. Resource Management: Promote stewardship of the earth's resources. The earth's resources include: perpetual resources, renewable resources, and non-renewable resources.
      a. Preserve or renew biodiversity and ecosystems.
      b. Maximize use of biobased and local, regional, and recycled content materials.
      c. Maintain or improve water quality and promote water stewardship.
      d. Employ job-site recycling and salvage procedures.
   2. Toxicity/IEQ: Promote good indoor environmental quality (IEQ) Aspects of IEQ include: light quality, acoustic quality, and air quality.
      a. Utilize a precautionary approach.
      b. Maximize use of non-toxic, non-hazardous, healthy and safe building materials.
   3. Performance: Promote efficiencies in operational performance. Aspects of operational performance include: durability, maintainability, energy efficiency, and water efficiency.

C. Cal-GREEN Environmental Requirements:
   1. This Project shall comply the requirements of Chapter 5 of the California Green Building Standards Code.
   2. Items Include, but are not limited to:
      a. Sealed building envelope (5.407).
      b. Construction Waste Reduction (5.408)
      c. Pollutant Controls including VOC content and formaldehyde limits (5.504).
      d. Interior moisture controls (5.505)
      e. Commissioning and Operations (5.410).
      f. Indoor Air Quality (5.506)
      g. Environmental Comfort (5.507)]

1.4 WORK UNDER OTHER CONTRACTS (NIC)

A. Work on Project which may be executed prior to, along with, or after completion of Work of this Contract, and which is excluded from this Contract include:
   1. Fixtures, Furnishings, and Equipment.

1.5 WORK RESTRICTIONS

A. Limit use of premises for Work, storage, and access to allow:
   1. Work by Owner.
   2. Work by other contractors.
   3. Owner occupancy of adjacent building and parking lot.

B. Coordinate use of premises with Owner.

C. Assume responsibility for protection and safekeeping of products stored on site under this Contract.

D. Move stored products which interfere with operations of Owner or separate contractors.

E. Conduct operations to ensure least inconvenience to public and to occupied areas.

F. Obtain and pay for use of additional storage or staging areas needed for operations.

G. Do not load structure with weight that would jeopardize its safety.

H. Should it be necessary to use portions of existing streets, sidewalks or right of ways for operations, obtain approval and pay for use of such areas in accordance with requirements of authorities having jurisdiction.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 012500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Contract is based upon products and standards established in Contract Documents without consideration of proposed substitutions.

B. Products specified define standard of quality, type, function, dimension, appearance and performance required.

C. Substitution proposals are permitted for specified products, except where specified otherwise.

D. Do not substitute products unless substitution has been accepted and approved in writing by Architect/Owner.

1.2 TIME OF SUBSTITUTION REQUESTS

A. Within 30 days after award of Contract or Notice to Proceed, Architect will consider formal substitution requests from Contractor only. Use attached "Substitution Request Form." No requests for substitutions will be accepted after that time without Owner's authorization and with following stipulation.

B. Architect will record time required for evaluating substitutions proposed by Contractor after receipt of bids, and for making changes in the Contract Documents. Whether or not Architect accepts Contractor proposed substitution, Contractor shall reimburse Owner for charges of Architect and Architect's consultants for evaluating each proposed substitution.

C. No additional substitutions will be considered after this initial process unless a substitution is required due to specified product being removed from or unavailable in market place.

1.3 SUBSTITUTION PROCEDURES

A. Limit each request to one proposed substitution.

B. Submit substitution requests on attached form complete with attachments necessary to fully document proposed substitution. Submit in number of copies required for Contractor's use and distribution, plus one copy to be retained by Architect.

C. Copy of required form is bound after last page of this Section. Remove form for making additional copies or request an original copy from Architect.

D. Document each request with supporting data substantiating compliance of proposed substitution with Contract Documents, including:
   1. Manufacturer's name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.
   2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance and other pertinent characteristics.
   3. Reference to article and paragraph numbers in Specification section.
   4. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
   5. Changes required in other Work.
   6. Availability of maintenance service and source of replacement parts, as applicable.
   7. Certified test data to show compliance with performance characteristics specified.
   8. Samples, when applicable or requested.
   9. Other information as necessary to assist Architect's evaluation.

E. A request for substitution for an equivalent product constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it is equal or superior in all respects to specified product.
   2. Will provide warranty as required for specified product.
   3. Will coordinate installation and make changes to other Work which may be required.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Certifies that proposed product will not affect or delay Construction Progress Schedule.
6. Will pay for changes to building design, including architectural or engineering design, detailing, and construction costs caused by the requested substitution.

F. Substitutions will not be considered when:
1. Indicated or implied on shop drawings or product data submittals without formal request submitted in accord with this Section.
2. Submittal for substitution request has not been reviewed and approved by Contractor.
3. Acceptance will require substantial revision of Contract Documents or other items of the Work, unless substitution is required to bring Project into GMP compliance.
4. Submittal for substitution request does not include point-by-point comparison of proposed substitution with specified product.

1.4 OWNER AND ARCHITECT'S REVIEW

A. Architect will review requests for proposed substitutions and make recommendations to Owner on Substitution Request Form with reasonable promptness.

B. Considerations for acceptance will be based on conformance with Contract Documents, including following as applicable:
1. Physical dimension and clearance requirements to satisfy space limitations.
2. Static and dynamic weight limitations; structural properties.
3. Audible noise levels.
4. Vibration generation.
5. Interchangeability of parts or components.
6. Accessibility for maintenance to allow possible removal or replacement.
7. Design.
8. Colors, textures, and finishes.
9. Compatibility with other materials, products, assemblies, and components.

C. Owner's decision to approve or reject requested substitution will be indicated on Substitution Request Form. Approval of substitution not valid without Owner's signature.

D. Rejection of proposed substitution by Owner requires use of specified product.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

Attachment: Substitution Request Form, 2 pages.

Contractor:

Project:

SUBSTITUTION REQUEST FORM

Note: Limit this Request to one proposed substitution

TO: Architect Date: _____ Request Number _____

FROM: ❑ Contractor ❑ Subcontractor ❑ Supplier ❑ Manufacturer _____

Specified Item: _____

Section: _____ Page: _____ Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone Number: _____
Trade Name: _____ Model Number: _____
Installer: _____ Address: _____ Phone Number: _____
History: ❑ New product ❑ 2 to 5 years old ❑ 5 to 10 years old ❑ More than 10 years old

Differences between proposed substitution and specified product: _____

❑ Point by point comparison data attached - **REQUIRED BY ARCHITECT**

Reason for Not Providing Specified Item: _____

Similar Installations:

Project: _____ Architect: _____
Address: _____ Owner: _____
Date Installed: _____

Project: _____ Architect: _____
Address: _____ Owner: _____
Date Installed: _____

Proposed substitution affects other parts of Work: ❑No ❑Yes; explain

Savings to Owner for accepting substitution: ($_____)

Proposed substitution changes Contract Time: ❑ No ❑ Yes; Add/Deduct _____ days.

Supporting Data Attached:
❑ Product Data ❑ Drawings ❑ Tests ❑ Reports ❑ Samples ❑

Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable is available.
- Proposed substitution will not affect or delay Construction Progress Schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including architectural or engineering design, detailing, and construction costs caused by the requested substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by:

Signature:

Firm:

Address:

Telephone:

Attachments:

ARCHITECT'S REVIEW AND ACTION

- ❑ Approve Substitution - Make submittals in accordance with Specification Section 013300.
- ❑ Approve Substitution as noted – Make submittals in accordance with Specification Section 013300.
- ❑ Reject Substitution - Use specified products. Architect shall not have responsibility for performance of substitution approved by Owner and rejected by Architect.
- ❑ Substitution Request received too late - Use specified products.

Signed by:

Comments

OWNER'S REVIEW AND ACTION (Approval of Substitution not valid without Owner's signature)

- ❑ Substitution approved - Make submittals in accordance with Specification Section 013300.
- ❑ Substitution approved as noted - Make submittals in accordance with Specification Section 013300.
- ❑ Substitution rejected - Use specified products.

Signed by:

Comments

END OF FORM

SECTION 012600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
1. Section 012500 - Substitution Procedures
2. Section 012900 - Payment Procedures.
3. Section 013300 - Submittal Procedures.
4. Section 016000 - Product Requirements.
5. Section 017700 - Closeout Procedures.

1.2 SUBMITTALS

A. General:
1. Submit names of individuals authorized to receive Contract modification documents.
2. Submit names of individuals responsible for informing Contractor's employees and affected subcontractors of Contract clarifications and modifications.

1.3 CHANGE PROCEDURES

A. General: Change procedures are written instructions issued after execution of Contract Agreement.

B. Minor Changes in the Work:
1. Form: AIA Document G710, *Architect's Supplemental Instructions*.
2. Description: Written instructions, clarifications, or interpretations of Contract Documents not involving adjustment to Contract Sum or Contract Time. Instructions or interpretations are binding on Owner and Contractor.
3. Procedure: Document is prepared and signed by Architect and distributed to Owner and Contractor. Architect's Supplemental Instructions are effective upon receipt.

C. Proposal Request:
1. Form: AIA Document G709, *Proposal Request*.
2. Description: Written proposed change of Work within Contract scope consisting of additions, deletions, and other revisions. Proposal Request is for information only and does not authorize changes in Contract Sum or Contract Time. Contractor evaluates proposal for pricing and scheduling impact.
3. Procedure:
   a. Document is prepared and signed by Architect. Copies are sent to Owner and Contractor.
   b. Contractor shall review Proposal Request and submit Change Order Request and Proposal Worksheet Detail and Summary Forms with proposed changes in Contract Sum and Contract Time.
   c. Prepare and submit Change Order Request and Proposal Worksheet Detail and Summary Forms Architect within 20 days of Proposal Request receipt. Proposed Contract Sum and Contract Time changes quoted by Contractor shall remain valid for 30 days from receipt by Architect.

D. Change Order Request:
1. Attached Forms:
   a. Change Order Request: Describes and summarizes Contractor's proposed changes. Indicates changes in Contract Sum and Contract Time.
   b. Proposal Worksheet Summary: Summarizes labor, materials, overhead and profit, bonds, insurance, and tax of proposed Contract additions and deductions.
   c. Proposal Worksheet Detail: Summarizes labor and material costs of each subcontractor involved in proposed change.

2. Description: Written proposed change of Work consisting of additions, deletions, and other revisions. Submit Change Order Request to Architect for conditions which require Contract Document modifications. Include proposed changes in Contract Sum and Contract Time.
3. Procedure:
   a. Proposed changes are documented by Contractor on Change Order Request, Proposal Worksheet Summary, and Proposal Worksheet Detail forms. Documents include description of proposed changes and summary of changes in Contract Sum and Contract Time are prepared and signed by Contractor. Send copies to Owner and Architect.
   b. Comply with requirements of Section 012500 - Product Substitution Procedures for proposed changes in Work which include products or systems not contained in Contract Documents.
   c. Architect and Owner will review Change Order Request and evaluate proposed changes. Architect and Owner may accept or reject Change Order Request. Upon acceptance Architect will prepare Change Order to document Contract change.

E. Change Order:
1. Form: AIA Document G701, *Change Order*.
2. Description: Written change of Work within Contract scope consisting of additions, deletions, product substitutions, and other revisions, including proposed basis for adjustment to Contract Sum and Contract Time. Change Orders are signed by Owner, Contractor, and Architect. Owner's signature authorizes change.
3. Procedure: Document is prepared and signed by Architect; sent to Contractor for acceptance and signature; approved and signed by Owner; distributed to Architect and Contractor. Contractor shall perform changes upon receipt.

F. Construction Change Directive:
1. Form: AIA Document G714, *Construction Change Directive*.
2. Description: Written change of Work within Contract scope consisting of additions, deletions, and other revisions, including a proposed basis for adjustment to Contract Sum and Contract Time. Document is used in absence of agreement on terms of Change Orders.
3. Procedure:
   a. Document is prepared and signed by Architect and Owner. Contractor shall perform changes upon receipt.
   b. Adjustments to Contract Sum should be one of following:
      1) Lump sum.
      2) Unit price.
      3) Mutually accepted method.
      4) As provided in AIA Document A201 Subparagraph 7.3.6; maintain detailed records on time and material basis of Construction Change Directive Work.
   c. Architect will determine proposed method, time, and amount of Contract adjustment based on reasonable expenditures, and allowance for overhead, profit, and time.
   d. Contractor's signing of Construction Change Directive acknowledges agreement with proposed method for adjusting Contract Sum and Contract Time and is recorded as Change Order.
   e. Contractor disagreement or no response to proposed method for adjusting Contract Sum or Contract Time does not relieve Contractor from responsibility to perform Work.
   f. Payment for Construction Change Directives will be made in accordance with AIA Document A201 Subparagraph 9.3.1.1.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

Attachments

CHANGE ORDER REQUEST (PROPOSAL)

Project: _____ COR Number: _____

_____ From (Contractor): _____

To: _____ Date: _____

_____ A/E Project Number: _____

RE: _____ Contract For: _____

This Change Order Request (COR) contains an itemized quotation for changes in the Contract Sum and/or Time in response to proposed modifications to the Contract Documents base on Proposal Request Number _____

Description of Proposed Change:

❑ Attachment

Reason For Change:

Does Proposed Change involve a change in Contract Sum or Contract Time? ❑ Yes ❑ No
If Yes: Proposed Change in Contract Sum _____
Proposed Change in Contract Time _____

Attached Pages: Proposed Worksheet Summary
Proposed Worksheet Detail(s)

Signed by: _____

❑ Attached is supporting information from ❑ Subcontractor ❑ Supplier ❑ _____ ❑ _____

Copies: ❑ Owner ❑ Contractor ❑ Consultants ☐ Field ❑ _____ ❑ _____

PROPOSAL WORKSHEET SUMMARY

Project: _____ COR Number: _____

_____ From (Contractor): _____

To: _____ Date: _____

Proposal Request Number: _____ A/E Project Number: _____

Complete and attach Proposal Worksheet Detail for each Subcontractor. Enter Work Sheet Information below.

SUBCONTRACTORS' ADDITIONS:

Sheet		Description	Material	Labor	Sub-Total
1					
2					
3					
4					
5					
6					
7					
Sub-Total					

SUBCONTRACTORS' DEDUCTS:

Sheet		Description	Material	Labor	Sub-Total
1					
2					
3					
4					
5					
6					
7					
Sub-Total					

Subcontractors' Net: _____
Subcontractors' OH&P: _____
Subcontractors' Bond: _____
Subcontractors' Total: _____
General Contractor OH&P: _____
General Contractor Bond: _____
Insurance: _____
Tax: _____
WORKSHEET TOTAL: _____

PROPOSAL WORKSHEET DETAIL

Project Name: _____ COR Number: _____

Project Number: _____ Detail Sheet Number: _____

Subcontractor Name: _____ Date: _____

Phone Number/Contact Person: _____ **DO NOT MARK IN SHADED AREAS.**

ADDITIONS

				UNIT PRICES		SUB-TOTALS		
	Ref. No.	**Item Description**	**Quantity**	**Materials**	**Labor**	**Materials**	**Labor**	**TOTAL**
1								
2								
3								
5								
Sub-Total (Enter this number on Work Sheet Summary.)								

DEDUCTIONS

				UNIT PRICES		SUB-TOTALS		
	Ref. No.	**Item Description**	**Quantity**	**Materials**	**Labor**	**Materials**	**Labor**	**TOTAL**
1								
2								
3								
4								
5								
Sub-Total (Enter this number on Work Sheet Summary.)								

SECTION 012900

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Coordinate Schedule of Values and Applications for Payment with Construction Progress Schedule, Submittal Schedule, and List of Subcontracts.

1.2 SCHEDULE OF VALUES

A. General:
   1. Submit at least 15 days prior to submitting first Application for Payment.
   2. Upon request of Architect, submit additional data to substantiate accuracy of given values.
   3. Approved schedule will be used as basis for reviewing applications for payment.

B. Format:
   1. Use AIA Document G703 - *Continuation Sheet* for application and certificate for payment, or use letter size white bond paper following format of AIA Document G703.
   2. Contractor's standard form or electronic media printout will be considered on request.
   3. Follow 50 Division format established in Table of Contents of Project Manual for listing of categories. Identify each line item by number and title of respective Specification sections.
      a. Identify Schedule of Values with following information:
      b. Project name and location.
      c. Name of the Architect.
      d. Project number.
      e. Contractor's name and address.
      f. Date of submittal.

C. Content:
   1. List installed value of each item of Work and each subcontracted item of Work as separate line item to serve as basis for computing values for Progress Payments. Round off values to nearest dollar.
   2. For each major subcontract, list products and operations of that subcontract as separate line items.
   3. Include in each line item, as applicable, amount specified for allowances.
   4. Itemize separate line costs for performance and payment bonds, field supervision, field layout, temporary facilities and controls, and overhead and profit.
   5. For items on which payments will be requested for stored products, list sub-values for cost of materials, delivered and unloaded, with taxes paid.
   6. Sum of listed values shall equal total Contract Sum.

D. Review and Resubmittals:
   1. After Architect's initial review, revise and resubmit as necessary.
   2. Revise and resubmit whenever Change Order is issued. Show each Change Order as new line item. Submit revised schedule with next application for payment.

1.3 APPLICATIONS FOR PAYMENT

A. General:
   1. Maintain consistency with previous applications for payments as certified by Architect and paid by Owner.
   2. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
   3. Payment application times:
      a. Each progress payment date is as indicated in Agreement.
      b. Work covered by each Application for Payment is period indicated in Agreement.
   4. Payment application forms: Use AIA Document G702 *Application and Certificate for Payment* and G703 *Continuation Sheet* for Application for Payment.

5. Record Drawings: Substantiate that changes and updates to the Record Drawings have been recorded for the month, and that a binder is being maintained by the Contractor on-site.

B. Application Preparation:
1. Complete every entry on form, including notarization and execution by person authorized to sign legal documents on behalf of Contractor.
2. Incomplete applications will be returned without action.
3. Match data entries on Schedule of Values and Construction Progress Schedule. Use updated schedules if revisions have been made.
4. Include amounts of Change Orders and Construction Change Directives issued prior to last day of construction period covered by application.

C. Transmittal:
1. Submit 3 executed copies of each Application for Payment to Architect by date required for receipt; include waivers of lien and similar attachments with one copy.
2. Transmit each copy with transmittal form listing attachments, and recording appropriate information related to application in manner acceptable to Architect.

D. Waivers of Mechanics Lien:
1. With each Application for Payment submit waivers of mechanics liens from subcontractors and suppliers for construction period covered by previous application.
2. Submit partial waivers on each item for amount requested, prior to deduction for retainage, on each item.
3. When application shows completion of item, submit final or full waivers.
4. Owner reserves right to designate which entities involved in Work must submit waivers.
5. Waiver forms: Submit waivers of lien on properly executed AIA Document G706A, *Contractor's Affidavit of Release of Liens.*

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include following:
1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Construction Progress Schedule (preliminary if not final).
5. Submittal schedule.
6. Schedule of principal products.
7. Schedule of unit prices.
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from governing authorities for performance of Work.
12. Initial progress report.
13. Report of preconstruction meeting.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds (if required).

F. Application for Payment at Substantial Completion:
1. Following issuance of Certificate of Substantial Completion, submit Application for Payment reflecting Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of Work.
2. Required administrative actions and submittals that precede or coincide with this application include:
    a. Occupancy permits and similar approvals.
    b. Warranties and maintenance agreements (dated to commence on date of Substantial Completion).
    c. Test/adjust/balance records.
    d. Maintenance instructions.
    e. Meter readings.
    f. Start-up performance reports.

g. Change-over information related to Owner's occupancy, use, operation, and maintenance.
h. Application for reduction of retainage, and consent of surety, AIA Document G707A, *Consent of Surety to Reduction in or Partial Release of Retainage*.
i. Advice on shifting insurance coverages.
j. Final progress photographs.
k. Comprehensive list of incomplete or non-complying Work (initial punch list).

G. Final Payment Application: Required administrative actions and submittals which precede or coincide with submittal of final payment Application for Payment include following:
1. Completion of Project Closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
4. Submittal of AIA Document G707, Consent of Surety to Final Payment.
5. Assurance that Work not complete and accepted will be completed without undue delay.
6. Final cleaning.
7. Transmittal of required Project construction records to Owner.
8. Certified property survey.
9. Proof that taxes, fees and similar obligations have been paid.
10. Removal of temporary facilities and services.
11. Removal of surplus materials, rubbish and similar elements.
12. Change of door locks to Owner's access.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION – ENVIRONMENTAL

A. Contractors Environmental Manager: Designate an on-site party responsible for overseeing the environmental goals for the project and implementing procedures for the environmental protection.
   1. Qualification: Minimum 5 years construction experience on projects of similar size and scope; minimum 2 years experience with Environmental Management Systems (EMSs) such as ISO 14001; familiarity with environmental regulations applicable to construction operations.
   2. Responsibilities: Responsibilities shall include.
      a. Compliance with applicable Federal, State, and local environmental regulations, including maintaining required documentation.
      b. Implementation of the Waste Management Plan.
      c. Implementation of the IAQ Management Plan.
      d. Implementation of the Environmental Protection Plan.
      e. Training for Contractor personnel in accordance with their position requirements.
      f. Monitoring and documentation of environmental procedures.

B. Perform project quality control in accordance with requirements specified in Related Sections, for the following:
   1. Construction Waste Management and Disposal.
   2. LEED Requirements.
   3. Construction Indoor Air Quality (IAQ) Management.

C. Contractor’s Environmental Training program: Contractor shall provide environmental training for workers performing work on the project site. Training shall include the following:
   1. Overview of environmental issues related to the building industry.
   2. Overview of environmental issues related to the Project.
   3. Review of site specific procedures and management plans.

1.2 GENERAL COORDINATION PROVISIONS

A. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Architect of any error, inconsistency, omission, or apparent discrepancy discovered.

B. Allot time in construction scheduling for liaison with Architect; establish procedures for handling queries and clarifications. Use "Request for Interpretation" form for requesting information. Copy of form is bound after last page of this Section. Remove form for making additional copies or request an original copy from Architect. Limit each RFI to a single issue or a group of related issues.
   1. If Architect is able to respond to a request for interpretation by making specific reference to Drawing sheet or Specification Section, Contractor shall reimburse Owner for charges of Architect and Architect’s Consultants for performing review services for the Contractor.
   2. If Contractor disagrees with Architect’s response to Contractor’s RFI, Contractor shall notify Architect within seven days of receipt of response. Lack of such notification shall be understood to mean that Contractor agrees with response.
   3. Allow minimum 7-day response time from receipt of each RFI. RFI’s shall include a workable no-cost proposed solution from Contractor. If more than 10 RFIs are received within 4 working day period, Architect’s response time will be extended as necessary for professional response; order of responses will be based on priority established by Architect after consultation with Owner and Contractor.

C. In addition to other specified meetings, hold coordination meetings and conferences with personnel and subcontractors to ensure coordination of Work.

D. Coordinate scheduling, submittals, and Work of various Specification sections to avoid conflicts and ensure efficient and orderly sequence of installation of interdependent construction elements.

E. Coordinate Work of various Specification sections having interdependent responsibilities for installation, connection, and operation.

F. Verify that characteristics of operating equipment are compatible with building utilities and services.

G. Except as otherwise indicated, conceal pipes, ducts, conduit and wiring in construction. Coordinate locations of fixtures and outlets with finish elements.

H. Make provision to accommodate items scheduled for later installation.

1.3 COORDINATION DRAWINGS AND LAYOUTS

A. General:
1. Coordination drawings are not shop drawings and are not to be submitted to Architect for approval.
2. Coordination drawings show relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in space provided or to function as intended.
3. Except as otherwise specified, prepare composite coordination drawings to scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of site utilities, architectural, structural, mechanical, and electrical equipment and materials in relationship with each other, installations, and building components. Include dimensions.
4. Provide coordination drawings utilizing different colors to illustrate work of separate trades.
5. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to efficient flow of Work affecting one or more trades.
6. Indicate scheduling, sequencing, movement, and positioning of large equipment into building during construction.
7. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
8. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communications systems components, sprinklers, and other ceiling-mounted devices.
9. Show interrelationship of components to be shown on separate Shop Drawings.
10. Indicate required installation sequences.

B. Site Utilities: Include, but not necessarily limited to following:
1. Water Distribution: Pipe sizes, valve and meter locations, underground structures, connections, anchors, and reaction backing. Indicate spatial relationship between piping and other piping in same trench, and proximate structures.
2. Sanitary Sewerage: Pipe sizes, manholes, locations and elevations, underground structures, and connections. Indicate spatial relationship between piping and other piping in same trench, and proximate structures.
3. Drainage and Containment:
   a. Manholes and other structures, pipe sizes, locations, and elevations. Include details of underground structures and connections. Indicate spatial relationship between piping other piping in same trench, and proximate structures.
   b. Profile Drawings: Show systems piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate underground structures and pipe. Show types, sizes, materials, and elevations of other utilities that cross system piping
4. Storm Drainage:
   a. Pipe sizes, manholes and catch basins locations and elevations. Include details of underground structures and connections. Show other piping in the same trench and clearances from storm sewerage system piping. Indicate interface and spatial relationship between piping and proximate structures.
   b. Profile Drawings: Show storm sewerage system piping in elevation. Draw profiles at a horizontal scale of not less than 1 inch equals 50 feet and a vertical scale of not less than 1 inch equals 5 feet. Indicate pipe and underground structures. Show types, sizes, materials, and elevations of other utilities crossing sewerage system piping.

C. Structural Systems: Include, but do not necessarily limit to following:
   1. Structural frame showing interface with exterior cladding.
   2. Location of openings in relation to structure.
   3. Show attachments to decking, structural elements, and other systems.

D. Mechanical Systems: Include, but do not necessarily limit to following:
   1. Proposed locations of piping, ductwork, equipment, and materials.
   2. Proposed locations for access panels and doors.
   3. Clearances for installing and maintaining insulation.
   4. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance. Show access locations.
   5. Equipment connections and support details.
   6. Exterior wall and foundation penetrations.
   7. Fire-rated wall and floor penetrations.
   8. Sizes and location of required concrete pads and bases.
   9. Valve stem movement.

E. Plumbing Systems: Include, but do not necessarily limit to following:
   1. Proposed locations of clean-outs.

F. Electrical Systems: Include, but do not necessarily limit to following:
   1. Proposed locations of major raceway systems, equipment, and materials.
   2. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance. Show access locations.
   3. Exterior wall and foundation penetrations.
   4. Fire-rated wall and floor penetrations.
   5. Equipment connections and support details.
   6. Sizes and location of required concrete pads and bases.

G. Coordinate in field with affected trades for proper relationship to Work based on Project conditions.

H. Notify Architect of conflicts and other coordination issues requiring resolution prior to commencing construction in each affected area.

I. Submit Contractor's certification to Architect that coordination documents have been completed and coordination issues have been identified and resolved prior to commencing construction in each affected area.

J. Make coordination documents available in field office for review by Architect and Owner during entire period of construction.

1.4 COORDINATION OF SPACE

A. Coordinate use of Project space and sequence of installation of plumbing, fire protection, mechanical and electrical Work. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with building lines. Utilize space efficiency to maximize accessibility for other installations, for maintenance, and for repairs.

B. Layout of plumbing, fire protection, mechanical, and electrical systems, equipment, fixtures, piping, ductwork, conduit, specialty items, and accessories indicated on Drawings is diagrammatic. Variations in alignment, elevation, and details required to avoid interference and satisfy architectural and structural limitations are not necessarily shown.

C. Prior to installation of material and equipment, review and coordinate Work with Architectural and Structural Drawings to establish exact space conditions. Where available space is inadequate or where reasonable modifications are not possible, request information from Architect before proceeding.

D. Coordinate installation to prevent conflicts and cooperate in making, without extra charge, reasonable modifications in layout as needed.

E. Provide clear access to control points, valves, strainers, control devices, and specialty items of every nature related to such systems and equipment to obtain maximum head room. Provide adequate clearances as necessary for operation and maintenance.

1.5 COORDINATION OF CONTRACT CLOSEOUT

A. Coordinate completion and clean up of Work in preparation for Substantial Completion.

B. To minimize disruption of Owner's activities after occupancy of premises, coordinate access to site by various trades for correction of defective Work and for correction of Work not in accordance with Contract Documents.

1.6 GENERAL MEETING REQUIREMENTS

A. Schedule meetings and conferences throughout progress of Work; each session scheduled, administered, and presided by entity indicated. Requirements for meetings and conferences include:
   1. Prepare agenda for each conference and meeting.
   2. Distribute written notice to participants 7 days in advance of scheduled date.
   3. Make physical arrangements.
   4. Record minutes and attendees; include significant proceedings and decisions.
   5. Reproduce and distribute copies of minutes within 5 days after each meeting.
   6. Distribute one copy of minutes to each participant and to entities affected by decisions made at meeting.
   7. Distribute one copy of minutes to Architect and Owner.
   8. Maintain in field office one copy of agenda and minutes for each conference and meeting.

B. Representatives attending meetings shall be qualified and authorized to act on behalf of entity each represents.

C. Architect and professional consultants may attend meetings to ascertain that Work is consistent with Contract Documents.

D. Owner may be present at meetings and may propose agenda items.

1.7 PRECONSTRUCTION CONFERENCES

A. Schedule preconstruction conferences no later than 7 days prior to commencement of Work. Convene at Project site.

B. Attendees:
   1. Architect and professional consultants; Architect presides over meeting and is responsible for minutes.
   2. Owner.
   3. Contractor.
   4. Major subcontractors.
   5. Others as appropriate.

C. Minimum Agenda:
   1. Administrative and procedural issues:
      a. Designation of key personnel.
      b. Review and clarify responsibilities of parties to contract.
      c. Communications procedures.
      d. Review of proposed subcontractors, materials, equipment, and products.
      e. Application for payment procedures; schedule of values, proposal requests, change orders.
      f. Critical work sequencing; long lead time items.
      g. Submittal and construction progress schedules.
      h. Submittal requirements; complete, correct, and timely submittals; scheduled dates.
      i. Procedures for submitting product data, shop drawings, samples, and other submittals.
      j. Product options and substitutions procedures.
      k. Procedures for requests for interpretations (RFI), minor changes, field decisions, construction change directives, proposal requests, change orders, and filing claims.
      l. Procedures for testing and inspection, including timely notification.

m. Responsibilities and limitations of authority of testing laboratories; distribution of reports.
n. Procedures for maintaining Project Record Documents.
o. Schedule for progress meetings.

2. Site mobilization and utilization:
   a. Use of premises; office and storage areas.
   b. Temporary utilities and services.
3. Environmental requirements and procedures.
   a. Solid Waste Management Plan.
   b. IAQ Management Plan.
   c. Procedures for noise and acoustics management.
   d. Environmental Management Plan.
   e. Environmental Regulatory Requirements.

1.8 PROGRESS MEETINGS

A. Schedule periodic meetings as necessary by progress of Work; day, location, and time to be determined. Convene at Project site.

B. Attendees:
1. Contractor; presides over meeting and is responsible for minutes.
2. Subcontractors as appropriate.
3. Owner.
4. Others as appropriate to agenda.

C. Minimum Agenda:
1. Approval of minutes of previous meeting.
2. Work progress since previous meeting:
   a. Current activities.
   b. Critical activities.
   c. Deviations from schedule.
3. Field observations, problems, conflicts, and decisions.
4. Deficiencies:
   a. Identification of items.
   b. Status of correction.
5. Requests for Interpretations (RFIs):
   a. Status of clarification.
   b. Status of proposal requests.
6. Changes and modifications:
   a. Status of change orders.
   b. Pending changes.
   c. Pending claims and disputes.
   d. Clarification decisions of Architect or Owner.
7. Problems and conflicts which impede planned progress.
8. Review environmental requirements and procedures. Review status of:
   a. Solid Waste Management.
   b. IAQ Management Plan.
   c. Environmental Management Plan.
   d. Commissioning.
9. Construction Progress and Submittal Schedules:
   a. Off-site fabrication and delivery schedules.
   b. Effect of proposed changes on construction progress schedule and coordination.
   c. Submittal schedules, status of submittals, and effect on construction progress schedule.
   d. Corrective measures to regain projected schedule.
10. Planned progress during succeeding Work period.
11. Adequacy of work forces.
12. Coordination between elements of Work.
13. Environmental Coordination:

a. Coordinate activities included in various Sections to assure efficient and orderly installation of each component. Coordinate operations included under different Sections that are dependent on each other for proper installation and operation.
b. Interior finishes: Schedule construction operations with consideration for indoor air quality in accordance with Section 018113.
c. Commissioning: The project will have selected building systems commissioned as specified in Section 019100 – Commissioning. Coordinate prefunctional test and start-up testing with commissioning.

14. Maintenance of Project Record Documents.
15. Other business relating to progress of Work.

D. Meeting Minutes:
1. Include column to indicate who is required to take action and date action is to be completed. Each of these items requiring action will be carried in subsequent minutes of meeting as "old business" until noted as "resolved."
2. As minimum, separate into following categories:
a. Old business.
b. New business.
c. Work progress.
d. Deficiencies.
e. RFIs.
f. Proposed changes.
g. Schedules.
h. Submittals.
i. Other business, including events to be accomplished by next meeting.

1.9 PREINSTALLATION CONFERENCES

A. Schedule preinstallation conferences required in individual Specification sections. Convene at Project site prior to commencing Work of the section.

B. Attendees:
1. Project superintendent; presides over meeting and is responsible for minutes.
2. Subcontractor (installer, applicator, or erector).
3. Material or equipment supplier.
4. Manufacturers' representative.
5. Others directly affecting, or affected by the work.
6. Testing agency (if necessary).
7. Subcontractors as appropriate.
8. Owner, Architect, and professional consultants may attend as appropriate.
9. Others as appropriate to agenda.

C. Minimum Agenda:
1. Access to work and conditions of proper installation.
2. Conditions of installation, such as substrates, existing and surrounding conditions, and environmental conditions.
3. Conditions detrimental to installation.
4. Preparation procedures, including protection of adjacent work.
5. Verify installers' receipt and understanding of installation instructions.
6. Review submittals, installation procedures, and sequence.
7. Review coordination with other work.
8. Evaluate delivery schedule and Construction Progress Schedule.
9. Observe sample installation.
10. Required protection procedures.
11. Observe actual installation areas.

1.10 CLOSEOUT CONFERENCE

A. Schedule Project Closeout conference prior to requesting Substantial Completion.

B. Attendees:
1. Contractor; presides over meeting and is responsible for minutes.

2. Major subcontractors.
3. Owner, Architect, and professional consultants may attend as appropriate.
4. Others as appropriate to agenda.

C. Minimum Agenda:
1. Start-up of facilities and systems.
2. Testing, adjusting, and balancing.
3. System demonstration and observation.
4. Operation and maintenance instructions for the owner’s personnel.
5. Indoor air quality plan and procedures.
6. Contractor’s inspection of work.
7. Contractor’s preparation of an initial "punch list."
8. Procedure to request Architect inspection to determine date of substantial completion.
9. Completion time for correcting deficiencies.
10. Inspections by authorities having jurisdiction.
11. Certificate of occupancy and transfer of insurance responsibilities.
12. Partial release of retainage.
13. Preparation for final inspection.
14. Closeout submittals:
    a. Project Record Documents.
    b. Operating and maintenance documents.
    c. Operating and maintenance materials.
    d. Warranties and bonds.
    e. Affidavits.
15. Final application for payment.
16. Final cleaning.
17. Contractor’s demobilization of site.
18. Maintenance.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

Attachment: Request for Interpretation

REQUEST FOR INTERPRETATION

Contractor: _____ Project: _____

Question to: Architect From: Contractor Date: _____

Other Signed: _____ RFI Number: __

RE:

Specification Section No. _____ Paragraph No. _ Drawing Ref. _____ Details _____

Contractor's Proposed Solution:

Response:

Response Above From: Architect To: Contractor Date Transmitted:_____ Dated Rec'd: __

Other Signed: _____

Copies: ☐ Owner ☐ ☐ ☐ ☐

SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 PHOTOGRAPHY

A. Cooperate with photographer, provide access to Work, and reasonable use of temporary facilities including temporary lighting.

B. Take photographs on date for each Application for Payment:
   1. Site clearing.
   2. Excavations.
   3. Foundations.
   4. Structural framing.
   5. Enclosure of building.
   6. Final completion.

C. Digital Images: Provide images in JPEG format, with minimum sensor size of 8.0 megapixels.

D. Take photographs from three different views.

E. Views:
   1. Consult with Architect for instructions on views required at each visit to site.
   2. Photograph from locations to factually illustrate condition of construction and state of progress.
   3. Provide photograph views at each specified time until enclosure of building.

F. Architect has right to request fewer photographs be taken at certain intervals so that more photographs may be taken at other times, providing that total number of photographs remain same.

G. Do not display photographs in publications without permission of Owner.

H. Additional Photographs:
   1. From time to time Architect may issue requests for additional photographs, in addition to periodic photographs specified.
   2. Additional photographs will be paid for by Change Order, and are not included in Contract Sum or Allowance.
   3. Architect will give photographer 3 days notice, where feasible.
   4. In emergency situations, photographer shall take additional photographs within 24 hours of Architect's request.
   5. Circumstances that could require additional photographs include, but are not limited to:
      a. Substantial Completion of major phase or component of Work.
      b. Owner's request for special publicity photographs.
      c. Special events planned at project site.
      d. Immediate follow-up when on-site events result in construction damage or losses.
      e. Photographs taken at fabrication locations away from Project site.
      f. Extra record photographs at time of final acceptance.

1.2 IMAGES

A. Digital Images:
   1. Submit complete set of digital image electronic files with each submittal of prints
   2. Provide complete set as Project Record Document.
   3. Identify electronic media with date photographs were taken.
   4. Submit images that have the same aspect ratio as the sensor, uncropped.

B. Deliver images to Owner in accordance with Section 017800. Provide index to electronic images in chronological sequence.

1.3 CONSTRUCTION PROGRESS SCHEDULE

A. Submit initial preliminary schedule 15 days prior to first Application for Payment. Within 7 days after return of reviewed submittal, resubmit revised data.

B. Prepare schedule as horizontal bar chart with separate bar for each major portion of Work or operation, identifying first work day of each week.

C. Content:
   1. Show complete sequence of construction by activity, with dates for beginning and completion of each major element of construction.
   2. Identify Work of separate stages or phases, separate floors, or other logically grouped activities.
   3. Show accumulated percentage of completion of each item, and total percentage of Work completed as of first day of each month.
   4. Indicate delivery dates for Owner furnished products.
   5. Provide sub-schedules to define critical portions of entire schedule.

D. Submittal Schedule:
   1. Provide separate sub-schedule to construction progress schedule indicating submittal dates and review time allowed for shop drawings, product data, samples and other similar data.
   2. Submit schedule submittal 15 days prior to first Application for Payment.
   3. Indicate dates reviewed submittals will be required from Architect taking into consideration the quantity of days specified for Architect's review.
   4. Allow sufficient time in schedule for resubmittal of disapproved submittals without causing construction delay.
   5. Indicate decision dates for selection of finishes and colors.

E. Progress Revisions:
   1. Identify activities modified since previous submittal, major changes in scope, changes in dates, and other identifiable changes.
   2. Provide narrative report as necessary to define problem areas, anticipated delays, and impact on schedule.
   3. Report corrective action taken, or proposed, and its effect.

F. Progress Submittals:
   1. Submit revised schedule with each application for payment.
   2. Submit in quantity required for distribution, plus 2 copies to be retained by Architect.

G. Distribute copies of reviewed schedule to project site file, subcontractors, suppliers, and other concerned parties.

H. Architect will review construction progress schedules and submittal schedules, and return within 30 working days of receipt.

1.4 PROPOSED PRODUCTS LIST

A. General:
   1. Submit at least 15 days prior to submitting first Application for Payment.
   2. Submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

C. Architect will reply in writing within 15 days stating whether there is reasonable objection to listed items. Failure to object to a listed item shall not constitute waiver of requirements of Contract Documents.

1.5 PROPOSED SUBCONTRACTORS AND MANUFACTURERS

A. Submit in writing within 30 days of award of contract complete listing of all subcontractors and manufacturers proposed for Project. Follow specification table of contents for subcontractor and manufacturer listing.

B. Architect will respond in writing within 21 days stating whether or not Owner or Architect have reasonable objection to any proposed subcontractor or manufacturer. Failure to reply constitutes notice of no reasonable objection; however, failure to reply does not alter Contract Document requirements.

END OF SECTION

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 013100 - Project Management and Coordination: Coordination drawings and layouts.
   2. Section 013200 - Construction Progress Documentation: Submittal Schedule and Proposed Products List.

1.2 SUBMITTAL PROCEDURES

A. Schedule submittals to expedite Project in accordance with approved Construction Progress Schedules and in such sequence as to cause no delay in the Work or in the activities of Owner or of separate contractors.

B. Deliver submittals to Architect's office. Submittals accepted only from Contractor.

C. Deliver LEED AND Cal-GREEN supporting documentation submittals independently from construction submittals and with separate transmittal form.

D. Submit product data, shop drawings, samples, calculations, certificates, manufacturer's instructions, and other items requested within each specification section.

E. Transmit each submittal using form which includes at a minimum:
   1. Transmittal Date
   2. Project Name and Architect's Project Number
   3. Number of submittals included.
   4. Submittal Number
   5. Submittal Name
   6. Date indicated on submittal
   7. Indication of other parties copied on transmittal
   8. Indication of whether submittal constitutes a Substitution
   9. Indication of whether submittal is an initial or resubmittal.

F. Use blue colored paper for informational submittals; white paper for all other submittals.

G. Transmit each submittal using form attached to this Section. Number submittals using Specification section number and unique numeric reference number. Indicate reference number of previous submission for resubmittals.

   For example, Specification Section - 079200; Reference Number - 02; previous Reference Number - 01.

H. Identify Project, Contractor, subcontractor or supplier, pertinent Drawing sheets and detail numbers, and Specification section number, as appropriate.

I. Apply Contractor's stamp, sign or initial and date certifying that review, verification of products, field dimensions, adjacent construction Work, and coordination of information, is in accordance with requirements of Work and Contract Documents.

J. Submittals will be returned without processing if they have not been reviewed and stamped by Contractor for coordination of work and conformance with the Drawings and Specifications prior to submission to Architect, if they are not initialed or signed by authorized person, if they are not dated, or if it becomes evident that they have not been properly reviewed. Delays resulting therefrom are not responsibility of Architect.

K. Clearly identify on submittals, or in writing at time of submission, deviations in submittals from requirements of Contract Documents.

L. Do not perform Work on any element requiring submittal and review of shop drawings, product data, samples, or other similar submittals until respective submittal has been approved by Architect.

M. Maintain in field office a copy of submittal schedule and log of submittals indicating current status of each item.

N. Submit deferred submittals to authorities having jurisdiction for each system and condition for this project requiring engineering or design selections by Contractor. Obtain approval from authority having jurisdiction.

1.3 PRODUCT DATA

A. Submit quantity of copies required by Contractor, plus 2 copies to be retained by Architect.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to Project. Delete inapplicable data.

1.4 SHOP DRAWINGS

A. Submit 2 bond copies. Only one copy will be returned to Contractor.

B. Bind in complete sets. Transmit in roll form to eliminate folding.

C. Present in clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.

D. Check and coordinate shop drawings of any section or trade with requirements of other sections or trades and as necessary for proper coordination and complete installation of Work.

E. Do not use Contract Drawings for shop drawings. Provide original shop drawings with changes from Contract Drawings clearly indicated. Contractor shall not rely on the receipt of any electronic media from the Architect or engineers for the preparation of any required shop drawings.

F. Show layout, details, materials, dimensions, thicknesses, methods of assembly, attachments, relation to adjoining Work, wiring diagrams, rough-in requirements, and other pertinent data and information.

G. Verify dimensions and field conditions. Clearly indicate field dimensions and field conditions.

H. Submit detail drawings of special accessory components not included in manufacturer's product data.

1.5 SAMPLES

A. Submit quantity required by Contractor, plus 1 set, except where indicated otherwise in Specification sections, to be retained by Architect.

B. Include identification on each sample with full Project information.

C. Submit samples to illustrate functional and aesthetic characteristics of product, including integral parts and attachment devices. Coordinate sample submittals for interfacing Work.

D. Except where specified otherwise, submit samples from full range of manufacturer's standard colors illustrating textures, patterns, and finishes for Architect selection.

E. Where custom colors are specified, submit samples illustrating colors, textures, patterns, and finishes for Architect's review. Architect will advise colors required or furnish samples for color matching.

F. Architect's acceptance of samples is for visual compliance with design intent only and does not constitute acceptance of performance criteria.

1.6 SUPPORT REACTION DESIGN DATA

A. When specified in individual Sections, submit support reaction design data.

B. Furnish separate submittal indicating complete description of loads, forces, and moments transferred to "base building" structure at each point of contact.

C. Include secondary forces resulting from connections used.

D. Do not submit engineering calculations for support reactions.

E. Submit design data bearing seal and signature of professional engineer responsible for design.

1.7 CALCULATIONS

A. When specified in individual Sections, submit calculations.

B. Submit engineering calculations for component sizes, deflections, and connections.

C. Submit calculations bearing seal and signature of registered professional engineer responsible for design.

D. Where existing conditions deviate from Contract Documents or shop drawings, submit calculations for existing condition, including calculations for anticipated corrective action required, and changes to loads transferred to "base building" structure.

1.8 INFORMATIONAL SUBMITTALS

A. Informational submittals upon which Architect is not expected to take responsive action may be so identified in Contract Documents. When professional certification of performance criteria of materials, systems, or equipment is required by Contract Documents, Architect shall be entitled to rely upon accuracy and completeness of such certifications.

B. Types of Informational Submittals:
   1. Design data: Submit with shop drawings.
   2. Test reports: Submit within two weeks of testing.
   3. Certifications:
      a. Submit certifications when specified in individual Specification sections.
      b. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
      c. Certifications may be recent or previous test results on material or product, but must be acceptable to Architect.
      d. Submit welder certifications 2 weeks prior to commencement of welding operations.
      e. Submit manufacturer or fabricator certifications with product data.
      f. Submit certificates of compliance within two weeks following approval or acceptance by authority having jurisdiction.
      g. Submit installation certifications within two weeks following completion of product installation.
   4. Engineering Certifications:
      a. Submit certified statement, signed and sealed by professional engineer responsible for design attesting to the following:
         1) Conformity to applicable governing codes.
         2) Conformity to criteria in Contract Documents.
         3) Component parts were designed or selected for locale and application intended.
      b. Submit with shop drawings. Submit prior to fabrication if shop drawings are not required by individual specification sections.
   5. Qualification Data:
      a. When specified in individual Sections, submit manufacturer’s, fabricator’s, and installer’s qualifications verifying years of experience.
      b. Include list of completed projects having similar scope of Work identified by name, location, date, reference names, and phone numbers.
      c. Submit manufacturer qualification data with proposed products list.
      d. Submit fabricator or installer qualification data with list of subcontractors at least 15 days prior to submitting first Application for Payment.
   6. Manufacturer’s Instructions:
      a. Refer to Section 016000 for requirements.
      b. When specified in individual Specification sections, submit manufacturer’s printed instructions for delivery, storage, assembly, installation, adjusting, finishing, and other pertinent data.
      c. Identify conflicts between manufacturer’s instructions and Contract Documents.
      d. Submit with product data.
   7. Manufacturer’s Field Reports:
      a. Refer to Section 014000 for requirements.

b. When specified in individual Specification sections, submit written results and findings of manufacturer's field services specified as part of Field Quality Control.
c. Submit within two weeks following completion of field services covered in individual reports.

C. Quantity: Submit in quantities specified for product data.

1.9 INCOMPLETE AND PARTIAL SUBMITTALS

A. Incomplete Submittal: Submittal not complying with specified submittal requirements.

B. Partial Submittal: Submittal subdivided into components as indicated in submittal schedule and each component submitted separately.

C. Architect will not review incomplete submittals. Complete submittals for each item are required. Submittal will not be considered official until it is complete in every respect. Delays resulting from incomplete submittals are not responsibility of Architect.

1.10 CONTRACTOR REVIEW

A. Review and approve submittals prior to transmittal to Architect; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.

B. Coordinate submittals with requirements of Work and of Contract Documents.

C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.

D. Do not fabricate products or begin Work which require submittals until approved submittals have been received from Architect.

1.11 ARCHITECT REVIEW

A. Architect will review construction progress schedules, submittal schedules, product lists, shop drawings, product data, and samples and return within 30 working days of receipt.

B. Do not make "Mass" submittals to Architect. "Mass Submittals" are defined as eight or more submittals in four working day contiguous period or 15 or more submittals in one week. If Mass submittals are received, Architect's review time stated above will be extended as necessary to perform proper review. Architect will review Mass submittals based upon priority determined by Architect after consultation with Owner and Contractor.

C. Informational submittals and other similar data are for Architect's information and do not require Architect's responsive action.

D. Architect's review of submittals is for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. Architect's review is not conducted for purpose of determining accuracy and completeness of items such as dimensions and quantities, which remain responsibility of Contractor.

E. Architect's review and approval of submittals does not relieve Contractor of responsibility for deviations from Contract Document requirements, unless Architect is informed in writing of deviations and approval is received in writing from Architect for such deviation.

F. Architect's review and acceptance of submittals does not indicate acceptance of changes in Contract time or cost.

G. Submittals made by Contractor which are not required by Contract Documents may be returned without action.

H. Submittals stamped "Approved": No corrections or resubmittal required; fabrication may proceed.

I. Submittals stamped "Approved as Noted": Comply with noted corrections and modifications; resubmittal not required; fabrication may proceed. If for any reason noted corrections and modifications can not be fully complied with, resubmit for review requesting clarification; do not proceed with fabrication.

J. Submittals stamped "Disapproved/Resubmit" and "Incomplete/Resubmit": Revise and resubmit for review; do not proceed with fabrication. Disapproved submittals will not be considered valid cause for construction delay.

K. Submittal approval does not authorize changes to Contract requirements unless accompanied by a Change Order, Architect's Supplemental Instruction, or Construction Change Directive.

L. Architect's review of samples and mock-ups is for visual compliance with design intent only and does not constitute review or acceptance of performance criteria nor does it constitute acceptance of a change to the contract documents.

1.12 RESUBMITTALS

A. Make resubmittals under procedures specified for initial submittals; identify changes made since previous submittal.

B. Architect will record time required to review resubmittals after original submittal and first resubmittal. Contractor shall reimburse Owner for charges of Architect and Architect's Consultants for reviewing submittal more than 2 times.

1.13 DISTRIBUTION

A. Duplicate and distribute reproductions of shop drawings, product data, samples, and other submittals which bear Architect's stamp of approval, to Project site file, subcontractors, suppliers, other affected contractors, and other entities requiring information.

B. Provide each testing and inspection agency one set of approved submittals for their exclusive use in providing specified quality control testing and inspection services; refer to Section 014500.

C. Provide additional set of approved submittals for Project record documents file; refer to Section 017800.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

SUBMITTAL TRANSMITTAL (Submit separate form for each product)

Contractor: Project:

TRANSMITTAL A To: Contractor _____ Date: _____ Submittal No: _____

From: Subcontractor _____ By: _____ Resubmission ❑ _____

Quantity	Reference Number	Title/Description/ Manufacturer	Specification Section Title, Paragraph / Drawing Detail Reference

❑ Submitted for Review and Approval
❑ Resubmitted for Review and Approval
❑ Complies with Contract Requirements
❑ Will be available to meet construction schedule
❑ A/E Review Time included in construction schedule
❑ Substitution Involved - Substitution Request Attached
❑ If Substitution involved, Submission includes full point by point comparative data or Preliminary details
❑ Items included in Submission will be ordered immediately upon receipt of approval

Other remarks on above submission:

TRANSMITTAL B To: Architect - Att: _____ Date Received by Contractor: _____

From: Contractor _____ Date Transmitted by Contractor: _____

Reviewed, Coordinated, and Approved by Contractor

Remarks on above submission:

❑ One copy retained by sender

TRANSMITTAL C To: Contractor _____ Date Received: _____

From: Architect ❑ Other Signed _____ Dated Returned: _____

❑ Approved
❑ Approved as noted
❑ Disapproved / Resubmit
❑ Not subject to review
❑ Submission Incomplete; Resubmit
❑ Received; No Action Required
❑ Full point by point comparative data required to complete approval process
❑ Provide File Copy with corrections identified
❑ Reproducible copies only returned
❑ Remarks on above submission:
❑ One copy retained by sender

TRANSMITTAL D To: Subcontractor _____ Date Received: _____

From: Contractor Signed _____ Dated Returned: _____

Copies ❑ Owner ❑ _____ ❑ _____ ❑ One copy retained by sender

Remarks on above:

SECTION 014000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 REGULATORY REQUIREMENTS

A. General: Reference to codes, standards or regulatory requirements made on Drawings or in Specifications are considered an integral part of Contract Documents as minimum requirements. Nothing in Contract Documents should be understood to conflict with laws, by-laws, or regulations of municipal, State, Federal, and other authorities having jurisdiction.

B. Should Contractor knowingly perform any work that does not conform with requirements of applicable codes, ordinances, regulations, or standards, Contractor shall assume full responsibility for such work and shall correct non-conforming work at no additional cost to Owner.

C. Code Requirements: As indicated on Drawings.

1.2 REFERENCE STANDARDS

A. Comply with association, trade, federal, commercial, standards generating organization (such as ANSI and ASTM), and other similar standards referenced within Specification sections, except where more explicit or stringent requirements are indicated or required by Specification or applicable codes.

B. Reference standards include their associated amendments and supplements.

C. Except where a specific date is indicated, date of standard is latest edition in effect at date of Contract Documents, or date of standard required by code.

D. Reference standards have same force and effect as if bound into or copied directly into Contract Documents; standards are made a part of Contract Documents by reference.

E. Contractual relationship of parties to the Contract shall not be altered from Contract Documents by mention or inference otherwise in reference standards.

F. Names and titles of standards are frequently abbreviated. Where acronyms or abbreviations are used in Specifications, they are defined to mean the recognized name of trade association, standards generating organization, governing authority, or other entity applicable to context of text provision.

G. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

H. When indicated by individual Specification section, obtain copy of standard. Maintain copy at Project site during submittals, planning, and progress of specific work, until Substantial Completion.

I. Units of measurements required by specifications govern regardless of units of measurement used in reference standards.

1.3 PROJECT MANUAL CONTENT

A. Language:

1. Imperative mood of sentence structure is generally used which places verb as first word in sentence. Except as otherwise indicated, requirements expressed imperatively are to be performed by Contractor.
2. In certain circumstances, the language of specifications and other contract documents are of abbreviated type. It implies words and meanings that will be appropriately interpreted. Words such as "the," "shall," "shall be," "Contractor shall," "a," "all," "an," "any," and other similar words are eliminated.
3. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicates.
4. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

B. Specialist Assignments:
   1. In certain circumstances, Specification text requires or implies that specific elements of Work are to be assigned to specialists who must be engaged to perform that element of Work. Such assignments are special requirements of Contract.
   2. Such assignments are intended to establish which party or entity involved in a specific element of Work is considered as being sufficiently experienced in indicated construction processes or operations to be recognized as "expert" in those processes or operations. Nevertheless, ultimate responsibility for fulfilling Contract requirements remains with Contractor.
   3. These requirements should not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. They are also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

C. Minimum Quality/Quantity:
   1. Quality level or quantity shown or specified is intended to be minimum for Work to be performed or provided.
   2. Except as otherwise specifically indicated, actual Work may either comply exactly with that minimum within specified tolerances, or may exceed that minimum within reasonable limits.
   3. In complying with these requirements, indicated numeric values are either minimums or maximums as noted, or as appropriate for context of requirements.
   4. Refer instances of uncertainty to Architect for decision before proceeding.

1.4 SYMBOLS

A. List of Symbols:
   # Number.
   % Percent.
   F Degrees Fahrenheit.
   C Degrees Celsius.
   ’ Feet.
   " Inches.
   ± Plus to Minus; Plus or Minus.
   +/- Plus to Minus; Plus or Minus.

1.5 DEFINITIONS

A. Basic Contract definitions are included in Conditions of the Contract.

B. And: Conjunction indicating that items in series are to be taken jointly. It may also mean plus or in addition to preceding items in the series.

C. Approved: Where used in conjunction with Architect’s response or action, meaning will be held to limitations of Architect’s responsibilities and duties as specified in General and Supplementary Conditions. In no case will Architect’s approval be interpreted as release of Contractor from responsibilities to fulfill requirements of Contract Documents.

D. Directed, Requested: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by Architect," "requested by Architect," and similar phrases. However, no such implied meaning shall be interpreted to extend Architect’s responsibility into area of construction supervision.

E. Finish: The manner or method of completion. The final appearance of a surface, including texture, smoothness, sheen, and color, after finishing operations have been performed. Finishing operations include preparation of substrate and application, curing, and protection of specified finish materials.

F. Furnish: Means to supply, purchase, procure and deliver complete with related accessories, ready for assembly, application, installation, and similar operations, as applicable in each instance.

G. Indicated: Refers to graphic representations, notes, or schedules on Drawings, or other paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help reader locate the reference. Location is not limited.

H. Install: Means to construct, assemble, erect, mount, anchor, place, connect, apply and similar operations, complete with related accessories, as applicable in each instance.

I. Installer: Entity (person or firm) engaged to perform a particular unit of Work at Project site, including installation, erection, application, repair, patching, and similar required operations. Such entities must be experienced in operations they are engaged to perform.

J. Mold Growth Products: Any organic cellular based product capable of fostering growth of mold. Examples include:
   1. Wood based products.
   2. Paper based products including paper faced products such as gypsum board and gypsum sheathing.
   3. Insulation products.
   4. Resins, binders, and adhesives.
   5. Wall coverings and carpet backings.

K. Or: Used to introduce any of the possibilities in a series. Items in the series are not required to be taken jointly. It does not mean that individual items in the series are optional requirements.

L. Product: Includes natural and manufactured materials, components, machinery, fixtures, equipment, devices, furnishings, systems, and their associated accessories to be incorporated into the Work.

M. Provide: Means to furnish and install, complete and ready for operations and use for purpose intended.

N. Regulations: Includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within construction industry that control performance of the Work.

O. Similar: Interpreted in its general sense and not as meaning identical. Elements defined as "similar" shall be coordinated in relationship to their location and connection with other parts of the Work.

P. True To Line, Plumb, Level, and Flat: Install Work within following tolerances, except where indicated otherwise:
   1. True to line: Allowed deviation from straight line within plus or minus 1/16 inch in one foot; plus or minus 1/8 inch in 10 feet; plus or minus 1/4 inch in 20 feet; and plus or minus 3/8 inch in lengths over 20 feet.
   2. Level: Allowed deviation from horizontal plane within plus or minus 1/16 inch in one foot; plus or minus 1/8 inch in 10 feet; plus or minus 1/4 inch in 20 feet; and plus or minus 1/2 inch in lengths over 20 feet.
   3. Plumb: Allowed deviation from vertical plane within plus or minus 1/16 inch in one foot; plus or minus 1/8 inch in 10 feet; plus or minus 1/4 inch in 20 feet; and plus or minus 1/2 inch in lengths over 20 feet.
   4. Flat: Allowed deviation from flat plane in any planar direction within plus or minus 1/16 inch in one foot; plus or minus 1/8 inch in 10 feet; plus or minus 1/4 inch in 20 feet; and plus or minus 3/8 inch in lengths over 20 feet.
   5. Tolerances are not accumulative.

1.6 QUALITY ASSURANCE

A. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

B. Ensure that persons performing Work are qualified to produce workmanship of specified quality.

C. Monitor quality control over products, suppliers, manufacturers, services, site conditions, and workmanship to ensure Work complies with Contract Documents.

D. Comply with specified reference standards for minimum quality of Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.7 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. Submit reports in accordance in accordance with Section 013300.

B. Submit qualifications of field observer 30 days in advance of required observations; observer is subject to approval of Architect.

C. When specified in individual Specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces, quality of workmanship, and conditions of installation as applicable, and to initiate instructions when necessary.

D. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

E. Submit reports within 7 days of observation. Distribute copies to Architect, Project site file, subcontractor, and other entities requiring information.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 014450

BUILDING ENVELOPE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Design requirements and testing for exterior walls.

1.2 DEFINITIONS

A. General: Definitions included in this Section supersede definitions appearing in reference documents.

B. Water Leakage:
   1. Condensation occurring during water infiltration tests is acceptable.
   2. Water infiltration is acceptable only if following conditions are satisfied:
      a. Water is contained and drained to exterior.
      b. Water will not cause damage to adjacent materials or finishes.
      c. There is no wetting of interior surface that would be visible to building occupants.
      d. There would be no staining or other damage to any part of completed building or furnishings.

C. Positive Pressure: Effect of wind blowing against wall for testing; inward acting pressure on system.

D. Negative Pressure: Effect of suction on lee side of building. For test, outward acting pressure on system.

1.3 SYSTEM REQUIREMENTS

A. Description of System: Exterior wall system, complete with glass, glazing, plastic windows, aluminum storefronts and windows, shims, sealants, and anchorage devices required to secure entire exterior envelope to building structural system and related appurtenances as necessary to provide complete and weathertight external envelope.

B. Acceptability of exterior wall is dependent upon successful test performances.

C. General:
   1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage or moisture disposal.
   2. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
   3. Provide concealed fastening wherever possible.
   4. Coordinate shop drawings and installation of exterior wall to resolve conflicts.
   5. Allow for installation tolerances, expansion and contraction of adjacent materials, and sealant manufacturer’s recommended joint design.
   6. Assemblies shall be free from rattles, wind whistles, and noise due to thermal and structural movement and wind pressure.
   7. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening, or fracturing connection between units and building structure or between units themselves.
   8. Do not assume glass, sealants, and interior finishes contribute to framing member strength, stiffness, or lateral stability.
   9. System shall drain to exterior face of wall; water entering system and condensation occurring within system by drain holes and gutters of adequate size to evacuate water without infiltration to interior.
   10. Provide components exposed to view uniform color and profile appearance.
   11. Do not design system to exceed sealant manufacturer’s recommended performance criteria.

D. Structural Requirements:

1. Provide exterior envelope components engineered by registered professional engineers licensed to practice structural engineering in jurisdiction where Project is located where specified in individual specification sections.
2. Anticipated building movement criteria:
   a. Horizontal seismic floor to floor drift: 2" maximum.
   b. Live load spandrel beam deflections: N/A.

E. Wind Loading:
1. Engineer typical exterior envelope to withstand positive and negative wind load acting normal to plane of walls as required by governing building code requirements using:
   a. Basic wind speed: 85 mph
   b. Exposure: B
   c. Refer to Drawing Sheet S001.
2. Engineer within 10 feet of corners and within 10 feet of parapet areas of exterior envelope to withstand upgraded wind requirements stipulated in ASCE 7.
3. Comply with city and county code requirements large missile impacts at 30 feet and below and small missile impacts between 30 and 60 feet above grade elevations.

F. Thermal Requirements:
1. Thermal movement:
   a. Provide for expansion and contraction due to structural movement and temperature changes without detriment to appearance or performance.
   b. Design for assumed temperature changes regardless of surface areas exposed to exterior and interior.
   c. Design exterior envelope to withstand movement within itself, between wall assembly and structure in deflection, warpage and racking without breakage of air or water seals.
   d. Provide joint movement capable of reacting to material temperature range of 180 degrees F.
2. Assume entire cross section has uniform temperature.
3. For thermal design other than joint movement, design winter surface temperature shall be 99 percent dry bulb winter temperature from ASHRAE handbook.

G. Seismic Requirements
1. Design for seismic loads and movement in accordance with applicable codes and following requirements.
2. At any floor, assume that maximum seismic displacement for floor will occur while floor immediately above and below remain in undisplaced condition.
3. Seismic displacements up to design seismic drift, no failure or gross permanent distortion of anchors, frames, glass, stone or panels will be allowed.
   a. Glazing gaskets may not disengage.
   b. Weather seals may not fail.
4. Provide two times design seismic drift displacement or 3/4 inch, whichever is greater, no failure or gross permanent distortion of anchors, frames, glass, stone, or panel will be allowed.
   a. Glazing gaskets may disengage.
   b. Weather seals may fail.
5. Engineer exterior envelope to accommodate seismic movements as established by Local Governing Code.

1.4 EXTERIOR GLAZING REQUIREMENTS

A. Exterior Window and Storefront Performance: Previously tested and successfully passed following:
1. Air Infiltration of Fixed Units: Tested not to exceed 0.06 cubic foot/minute square foot in accordance with ASTM E283, at pressure differential of 6.24 PSF.
2. Water Penetration Under Static Pressure: In accordance with ASTM E331; air pressure 20 percent design wind load; 6.24 PSF minimum, no uncontrolled water penetration allowed.
3. Water Penetration Under Dynamic Pressure: In accordance with AAMA 501.1; air pressure 20 percent design wind load; 6.24 PSF minimum, no uncontrolled water penetration allowed.

4. Structural Test Under Uniform Static Pressure: Provide testing in accordance with ASTM E330.
    a. Deflection under Uniform Loading: Limit deflection of aluminum members not to exceed L/175 or maximum 3/4 inch for spans less than 13'-6". Limit deflection to L/240 plus 1/4 inch for spans equal to or greater than 13'-6".
    b. No glass breakage allowed.
    c. Anchor movement not to exceed 1/8 inch.

1.5 SUBMITTALS

A. Provide submittals in accordance with Section 013300.

B. Provide test reports on accordance with Section 014500.

C. Mock-up Coordination Drawings: Provide in accordance with Section 014000.

1.6 FIELD TESTING

A. Hose Test:
1. Perform field check for water leakage on actual building conforming to test requirements of AAMA 501.2.
2. Test operating doors in the same manner as fixed wall areas. Modify test for joints of operating units.
3. No water leakage will be permitted, as defined in this Section.
4. Areas to be tested and number of tests will be determined by Owner, including but not necessarily limited to one test at 10 percent, one test at 50 percent, and one test at 85 percent of completed curtain wall work.
5. Test area: Minimum 75'-0" wide by 10 feet high.
6. Provide scaffold, hose, and water supply to perform tests, plus repeat unsuccessful tests after remedial work.
7. Ensure remedial measures maintain standards of quality and durability of original design. Remedial measures are subject to approval of Architect.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 014500

QUALITY CONTROL

PART 1 - GENERAL

1.1 FIELD SAMPLES

A. Field Sample Definition: Partial installation of selected materials installed in final location at Project site for Architect's review and approval of visual features and workmanship.

B. General:
   1. Provide field samples at site required by individual Specification sections.
   2. Erect at location acceptable to Architect; perform Work in accordance with applicable Specification sections.
   3. Construct complete, including Work of related trades required in finished Work.
   4. Make adjustments necessary to obtain approval from Architect. Do not proceed with further work until sample installation has been approved by Architect.
   5. Approved samples will serve as standard of quality and workmanship of Work; maintain samples until completion of relevant Work.
   6. Upon completion of Work or when directed by Architect, demolish field samples and remove from site, unless accepted by Architect as part of completed Work.
   7. Comply with requirements of Section 017400 for Construction waste management and disposal requirements.

1.2 MOCK-UPS

A. Mock-up Definition: Full size assemblies constructed remotely from final position on Project that incorporate several materials or elements of construction erected for Architect's review and approval of visual features and workmanship. Mock-ups represent quality of materials and workmanship required for Work.

B. General:
   1. Use materials, fabrication and installation methods identical with those indicated for Work. Simulate actual construction conditions as accurately as possible.
   2. Provide mock-ups required by individual Specification sections.
   3. Approval:
      a. Obtain Architect's written approval for each mock-up.
      b. Do not start production of materials for final Project site erection until Architect's approval of mock-up has been obtained.
      c. Approved mock-up will serve as standard of quality and workmanship of Work; maintain mock-up until completion of relevant Work.
   4. Upon completion of relevant Work or when directed by Architect, demolish and remove mock-up.
   5. Comply with requirements of Section 017400 for Construction waste management and disposal requirements.

1.3 TESTING LABORATORY SERVICES

A. General Requirements:
   1. Provide inspections, tests, and other services specified in individual specification sections and building code.
   2. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
   3. Where terms "Laboratory," "Inspector," "Inspection Laboratory," or "Testing Laboratory" are used, they mean and refer to officially designated and accredited testing laboratory complying with criteria established in ASTM E699.
   4. Provide testing laboratory with one set of Contract Documents and relevant approved submittals.

B. Selection and Payment: Owner will appoint, employ, and pay for services of an independent testing laboratory to perform specified inspections and testing, unless specified otherwise.

C. Testing Laboratory:
   1. Laboratory Qualifications:
      a. Maintain staff size and qualifications required by testing standards and specification.
      b. Maintain instruments and equipment in accordance with testing standards.
      c. Authorized to operate in state where Project is located.
   2. Laboratory Responsibilities:
      a. Cooperate with Architect and Contractor; provide qualified personnel after due notice.
      b. Perform inspections, sampling, and testing in accordance with specified standards.
      c. Ascertain compliance of materials and mixes with requirements of Contract Documents.
      d. Provide inspections, tests, and other services specified in individual specification sections.
      e. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products with Contract Documents.
   3. Laboratory and inspection personnel are not authorized to:
      a. Release, revoke, alter, relax, or enlarge any requirements of Contract Documents.
      b. Perform any duties of Contractor.
      c. Approve or accept any portion of Work.
      d. Stop the Work.

D. Contractor Responsibilities:
   1. Cooperate with laboratory personnel, provide access to Work and manufacturer's operations.
   2. Deliver samples or test mock-ups to testing laboratory prior to being incorporated into Work.
   3. Furnish copies of product tests or mill test reports as specified or required.
   4. Furnish incidental labor and facilities:
      a. To provide access to Work to be tested.
      b. To obtain and handle samples at Project site or at source of product to be tested.
      c. To facilitate inspections and tests.
      d. For storage and curing of test samples.
   5. Notify Architect and laboratory 48 hours prior to expected time for operations requiring inspection and testing services.
   6. When inspections or tests can not be performed after proper notification and at no fault of laboratory, reimbursement costs for laboratory expenses incurred will be charged to Contractor by deducting charges from Contract Sum.

E. Submittals:
   1. Provide submittals in accordance with Section 013300.
   2. Laboratory Reports:
      a. Include with each report:
         1) Date issued.
         2) Project title and number.
         3) Testing laboratory name, address, and telephone number.
         4) Record of temperature and weather conditions.
         5) Names of individuals making tests and inspections. Name and signature of person submitting report.
         6) Dates, times, and locations of sampling, testing, and inspection.
         7) Identification of specification section and products.
         8) Location in Project.
         9) Type of inspection or test.
         10) Reference standards used for test.
         11) Name of material suppliers.
         12) Results of tests and interpretation of test results.
         13) Professional opinion of whether tested and inspected Work complies with Contract Documents.
         14) Certified statement, signed and sealed by testing laboratory attesting to accuracy of testing results.
         15) Number pages.

b. Submit test reports within 2 weeks of test date.
c. After each inspection and test, promptly submit copies of written reports as follows:
   1) Owner: 1 copy.
   2) Architect: 3 copies.
   3) Code Officials: 1 copy.
   4) Contractor: 3 copies.
d. When requested by Architect, provide interpretation of test results and suggested remedies.

F. Failures and Retesting:
1. When initial inspections and tests indicate Work does not comply with Contract Documents, subsequent testing will be performed by same Testing Agency and will be done at Contractor's expense and deducted from Contract Sum.
2. Removal and replacement of Work necessitated by such non-compliance of Contract Documents shall be at Contractor's expense.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. Protect construction exposed by testing service activities.
B. Upon completion of inspection, testing, sample-taking, and similar services, repair damaged construction. Comply with requirements of Section 017329 - Cutting and Patching.

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. This Project is a registered U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design, LEED® project. Refer to Section 018113 for required prerequisites and credits for the Project to obtain the specified LEED Rating.

B. Environmental Protection: Provide environmental protection as required by authorities having jurisdiction and as indicated in the Contract Documents. Coordinate requirements for:
   1. Construction Waste Management.
   2. Construction Indoor Air Quality (IAQ) Management.

C. Comply with applicable laws and regulations of authorities having jurisdiction.

D. Obtain approval from authorities having jurisdiction for each temporary utility before use. Obtain required certifications and permits. Pay connection fees.

E. Construction Signs:
   1. Except for specified sign, no other construction signs will be allowed on site.
   2. Sign: Construct and install to withstand 85 mph wind velocity.
   3. Graphics Painter: Professional sign painter, minimum 2 years experience.
   4. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.
   5. Permit: Obtain and pay for permit if required to display sign on Project site. Coordinate requirements with authorities having jurisdiction.

1.2 SCHEDULING

A. Prepare schedule indicating dates for implementation and termination of each temporary utility.

B. At earliest feasible time, when acceptable to Owner, change over from use of temporary utility service to use of permanent utility service.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials for temporary facilities may be new or used suitable for intended purpose, but of adequate capacity for required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

B. Water: Provide potable water approved by local health officials.

2.2 TEMPORARY FIELD OFFICES

A. Field Office:
   1. Structurally sound, weathertight, equipped with heating, air conditioning, ventilation system, electric power outlets, lighting, and telephone.
   2. Temporary Building: Portable or mobile buildings may be used. Floor raised above ground.
   3. When permanent facilities are enclosed with operable utilities, relocate office into building upon written approval of Owner, and remove temporary building.
   4. Size:
      a. As required for Contractor's operations.
      b. Provide space in field office for project meetings, with table and chairs to accommodate 6 people.
   5. Equip with copier, high speed internet connection, and facsimile telecopier.

2.3 CONSTRUCTION AIDS

A. Provide scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, chutes, and other devices and equipment necessary to facilitate execution and construction contract administration of Work.

B. Provide cranes, hoists, rigging, material lifts, and other conveyances or apparatus as necessary to facilitate execution of Work.

C. Provide storage areas and sheds sized to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and inspection of products to requirements of Section 016000.

2.4 VEHICULAR ACCESS AND CONTROLS

A. Provide signs, signals, traffic cones and drums, flares and lights, and flag equipment of types required by authority having jurisdiction.

2.5 TEMPORARY BARRIERS AND ENCLOSURES

A. Partition performance requirements:
   1. Maximum flame spread index of 75 in accordance with ASTM E84.
   2. Minimum fire rating: 2 hours.

B. Partition Framing Options:
   1. Lumber: Stud grade; fire-retardant treated in accordance with AWPA C20.
   2. Steel stud framing in accordance with ASTM C645.

C. Gypsum Board: ASTM C36; Type X for fire-rated assemblies.

D. Plywood: PS-1; fire-retardant treated in accordance with AWPA C27.

E. Polyethylene: Fire-rated, reinforced, polyethylene sheet.

F. Doors:
   1. Non-fire-rated partitions: Wood or steel doors and frames.
   2. Fire-rated partitions: Steel doors and frames; 1-1/2 hour rating.
   3. Hardware:
      a. Provide each door with hinges, lockset, closer, and dust-tight gasketing.
      b. Provide fire-rated hardware on doors in fire-rated partitions.
      c. Construction masterkey locksets.

G. Temporary Fence:
   1. Contractor Options:
      a. Open mesh chain link fencing:
         1) Fabric: Hot dip galvanized steel wire woven into 2 inch mesh.
         2) Framing: Galvanized steel posts or roll-formed sections spaced to support fabric. Equip with top rail and bottom tension wire.
   2. Equip with gates and locks.

2.6 CONSTRUCTION SIGN

A. Support Structure and Framing: Wood or metal, in sound condition structurally adequate and suitable for specified finish.

B. Sign Surfaces: New exterior grade plywood with medium density overlay, minimum 23/32 inch thick, sized to minimize joints.

C. Nails, Bolts, and Fasteners: Types and sizes as required, galvanized or corrosion resistant.

D. Primers and Paints: Exterior type, colors as selected by Architect, two coats consisting of an appropriate primer followed by one coat of paint for support structure, framing and sign surfaces.

E. Graphics: Design, sizes, colors, and styles of lettering as selected by Architect. Apply over painted background.

F. Sign: One painted assembly of not less than 32 ft^2 with painted graphics to include:
   1. Title of Project.
   2. Name of Owner.
   3. Names and titles of Architect, Engineer, and Consultants.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install, maintain, and operate temporary utilities and services to ensure continuous operation. Modify and extend systems as Work progresses.

B. Install temporary facilities and controls in manner to produce reasonable uniform appearance, structurally adequate for required purposes, and properly maintained.

C. Modify and relocate temporary facilities and controls as necessary to accommodate progress of Work.

3.2 TEMPORARY ELECTRIC POWER AND LIGHTING

A. Provide temporary electrical service required for power and lighting, arrange provisions with utility company, and pay costs for service and energy consumed. Equip service with meter, main disconnect, and over current protection.

B. Complement existing power service capacity and characteristics as required.

C. Provide electrical service sized to provide adequate temporary power and lighting for construction operations.

D. Provide branch distribution system from temporary power source with distribution boxes and outlets located so that power and lighting is available throughout active work areas.

E. Permanent receptacles may be utilized during construction.

F. Replace receptacle plates and wiring devices damaged during construction.

G. Provide lighting to conduct construction operations.

H. Permanent lighting system may be utilized during construction.

I. Restore permanent lighting systems used during construction to original condition. Maintain lighting and provide routine repairs.

3.3 TEMPORARY HEATING AND VENTILATING

A. Provide heating as necessary to protect materials, products, and finishes from damage due to temperature or humidity.

B. Provide temporary heating and ventilating system that complies with codes and regulations.

C. Except where indicated otherwise in individual Specification sections, maintain minimum ambient temperature of 50 degrees F in enclosed areas where construction is in progress.

D. Provide heating system as necessary to maintain specified conditions during construction.

E. Permanent heating plant may be utilized for source of temporary heat, extended and supplemented with temporary heating devices as required.

F. Provide and pay for costs of supervision, operation, maintenance, fuel, and energy consumed.

G. Mold Prevention: Provide heating and ventilation as necessary to keep mold growth products dry during construction operations until Substantial Completion.
   1. Heat and ventilate as required to dissipate excessive humidity.
   2. Heat and ventilate as required to properly cure and dry materials.
   3. Heat and ventilate as required to dry wet areas and materials before installation of materials susceptible to moisture damage.
      a. Exception: Exterior skin of exterior enclosure assemblies.
      b. Use moisture meter to confirm that materials are sufficiently dry.
   4. Remove products exhibiting mold growth from project site, whether built into project or stored on site.

H. Use of permanent heating/ventilating and associated distribution systems will be permitted only upon meeting following requirements:
   1. Verify that installation is approved for operation, equipment is lubricated, and filters are in place.
   2. Equipment installed complete with accessories, started-up, maintained, serviced, and operated in strict accordance with manufacturer's instructions.

3. Provide and pay for regular replacement of filters and worn or consumed parts.
4. Operation of permanent systems or any portion thereof to provide temporary heat/ventilation does not constitute acceptance of system or portion of system.
5. Immediately before Substantial Completion, completely clean each permanent unit used, install new filters, and perform service functions required for placing units in use and qualifying for specified warranties.

I. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

3.4 TEMPORARY TELEPHONE SERVICE

A. Provide telephone service to temporary field office at time of Project mobilization.

3.5 TEMPORARY WATER

A. Provide, maintain, and pay for water service required for construction operations.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

C. Wash Facilities: Supply with potable water for personnel to wash-up for sanitary condition. Dispose of drainage properly. Provide cleaning compounds appropriate for each condition.

3.6 TEMPORARY FIELD OFFICE

A. Provide temporary field offices at time of project mobilization. Maintain during progress of Work.

3.7 TEMPORARY SANITARY FACILITIES

A. Provide and maintain sanitary facilities and enclosures. Provide temporary facilities until such time that designated permanent facilities become available.

B. Restore permanent facilities used during construction to new condition. Replace damaged fixtures, partitions, and accessories.

3.8 TRAFFIC REGULATION

A. Construction Parking Control:
1. Provide temporary parking areas to accommodate construction personnel.
2. When site space is not adequate, provide additional remote off-site parking.
3. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
4. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.
5. Prevent parking on or adjacent to access roads, in pedestrian paths or sidewalks, or non-designated areas.

B. Flagpersons: Provide trained and equipped flagpersons to regulate traffic when construction operations or traffic encroaches on public traffic lanes.

C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and guide traffic.

D. Access Roads and Approaches:
1. Construct and maintain temporary roads and approaches accessing public thoroughfares to serve construction area.
2. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
3. Provide and maintain access to fire hydrants free of obstructions.
4. Track-equipped vehicles not allowed on paved areas.
5. Provide means of removing mud from vehicle wheels before entering streets.
6. Designated existing on-site roads may be used for construction traffic.
7. Keep streets, drives, and walks adjacent to site and haul routes clean and free of dirt, debris, and litter caused by construction operations.

E. Haul Routes:
1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
2. Confine construction traffic to designated haul routes.
3. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

F. Traffic Signs and Signals: Comply with requirements of authorities having jurisdiction.

3.9 TEMPORARY BARRIERS AND ENCLOSURES

A. Provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and sidewalks.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

D. Exterior Enclosures:
1. Provide temporary weather tight enclosure at exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in specification Sections, and to prevent entry of unauthorized persons.
2. Mold Prevention: Provide temporary weathertight exterior enclosures as required to keep mold growth products dry during construction operations. Refer to Section 014000 for definition of Mold Growth Products.
3. Provide access doors with operating hardware and locks.

E. Site Enclosure Fence:
1. Before construction operations begin, install enclosure fence with lockable entrance gates.
2. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations.
3. Provide minimum 6 foot high fence around construction site.
4. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.
5. Adequately set fence posts to resist vandalism, wind loads, and construction operations.
6. Set fence posts in compacted mixture of gravel and earth or in concrete bases.
7. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.

F. Tree and Plant Protection:
1. Preserve and protect existing trees and plants designated to remain.
2. Provide 6 foot high barriers around drip line, with access for maintenance.
3. Consult with Architect; remove agreed-on roots and branches which interfere with construction.
4. Protect areas within drip lines from traffic, parking, storage, dumping, chemically injurious materials and liquids, ponding, and continuous running water.
5. Replace trees and plants damaged by construction operations.

3.10 TEMPORARY CONTROLS

A. Fire Protection:
1. Comply with local fire protection code and governing authorities.
2. Provide and maintain fire protection including, without limitation, fire extinguishers and other appropriate fire-fighting equipment ready for immediate use.
3. Distribute equipment around site, particularly in immediate vicinity of performance of welding or similar hazardous Work.
4. Store gasoline and other flammable liquids in Underwriter's Laboratories listed safety containers in conformance with recommendations of National Board of Fire Underwriters. Do not store gasoline or other flammable liquid within building.
5. Coordination with permanent fire protection systems:

a. At earliest feasible date in each area of Project, complete installation of permanent fire protection system, including connected services, and place into operation and use.
b. Instruct key construction personnel on use of systems.

B. Dust Control:
1. Execute Work by methods to minimize raising dust from construction operations.
2. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

C. Erosion and Sediment Control:
1. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow, and from waste disposal areas. Prevent erosion and sedimentation.
2. Minimize amount of bare soil exposed at one time.
3. Provide temporary measures such as berms, dikes, silt fences, drains, and other soil and erosion control devices required by authorities having jurisdiction.
4. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
5. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

D. Water Control:
1. Provide methods to control surface water to prevent damage to site or adjoining properties.
2. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff.
3. Protect site from puddling or running water.
4. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

E. Security:
1. Provide security and facilities to protect Work from unauthorized entry, vandalism, and theft.
2. Conduct operations in manner to avoid risk of loss, theft, or damage by vandalism.

3.11 CONSTRUCTION SIGN

A. Install project identification sign within 30 days after commencement of construction.

B. Place at location designated by Architect.

C. Install assembly plumb and level, rigidly braced, framed, and anchored to resist wind load.

D. Maintain signs; repair deterioration and damage.

E. Remove signs, framing, supports, and foundations at completion of Project and restore area.

3.12 TEMPORARY USE OF PERMANENT SYSTEMS

A. When allowed by Specifications, certain items of new permanent systems (equipment) may be used prior to Substantial Completion.

B. Prior to operating permanent equipment, notify Architect in writing of intended usage. Verify equipment is approved for operation and equipment is lubricated and ready for operation. Arrange for, obtain, and pay for necessary approvals, manufacturer's acceptance, inspections, permits, and other provisions necessary for temporary use.

C. Provide and pay for operation, maintenance, and regular replacement of filters, and worn or consumed parts. Use of permanent equipment shall not affect the warranty which begins at Substantial Completion of Project.

3.13 REMOVAL, CLEANING, AND RESTORATION

A. Refer to Section 017400 for cleaning and waste management. Send as much removed materials to recycling/reuse facility as possible.

B. Remove temporary above grade or buried utilities, equipment, facilities, controls, and materials prior to request for Substantial Completion.

C. Remove temporary paving that is not intended for or acceptable for integration into permanent paving.

D. In areas intended for landscaping, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in landscaped areas.

E. Remove materials contaminated with road oil, asphalt, or other compounds harmful to plant growth.

F. Repair or replace street paving, curbs, and sidewalks at temporary entrances as required by authorities having jurisdiction.

G. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

H. Clean and repair evidence or indication of installation or use of temporary Work.

I. Restore existing facilities and equipment used during construction to original condition. Restore permanent facilities and equipment used during construction to specified condition.

END OF SECTION

SECTION 01 56 39
TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Sections:

1.	Section 00 50 00:	Temporary Facilities and Controls.
2.	Section 31 10 00:	Site Clearing.
3.	Section 31 13 00:	Selective Tree and Shrub Removal and Trimming.
4.	Section 32 84 00:	Planting Irrigation.
5.	Section 31 01 90:	Operation and Maintenance of Planting.
6.	Section 32 01 90.33:	Tree Protection
7.	Section 32 93 00:	Landscape Planting

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches above the ground for trees up to, and including, 4-inch size; and 12 inches above the ground for trees larger than 4-inch size.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings (defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated).

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

E. Injury: is defined, without limitation, as any bruising, scarring, tearing, or breaking of roots, branches, or trunk.

F. Dripline: is defined as the outermost limits of the tree or shrub canopy.

G. Certified Arborist: is a consulting arborist certified by the International Society of Arboriculture.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of the following:

1. Organic Mulch: 1-pint volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

D. Qualification Data: For qualified arborist and tree service firm.

E. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

F. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

G. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.5 QUALITY ASSURANCE

A. Arborist: The District has retained an Arborist to advise the District and Architect on Tree and Tree installation issues.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."

D. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
    a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
    b. Enforcing requirements for protection zones.
    c. Arborist's responsibilities.
    d. Field quality control.

e. Irrigation system to plant material

1.6 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

1.7 GUARANTEE

A. If a tree to remain is destroyed or injured so that in the judgment of the Owner’s Representative it should be replaced, it shall be removed at the expense of the Contractor. Contractor shall pay compensation to the Owner of the property where the tree was located at the rate as specified herein this Section (see Compensation).

1.8 COMPENSATION

A. Contractor shall replace any existing tree that died or sustained injury from the result of the Contractor's negligence to provide adequate required tree protection, pruning, irrigation or maintenance during the course of construction operations. Compensation shall be awarded to the Owner as follows:

B. Contractor shall thoroughly remove damaged tree, including trunk, branches, and roots, at no cost to the Owner, and at the direction of the Owner's Representative. Contractor shall furnish and install an equal size tree, up to a six-inch (6") caliper size with a tree that is of the same form, species, shape, and in the same quantity as those tree(s) that were damaged, at the direction of the Owner's Representative.

C. Contractor shall provide an additional cash settlement to the Owner for each damaged tree, as evaluated by the Owner's Representative. Additional compensation shall be based on the following formula:

1. Tree caliper measurement of the damaged tree(s), where caliper is measured at the greatest trunk diameter 24" above the finished grade:

Tree Trunk Caliper	Amount
Less than 6"	none
6" to 12"	$9,000.00
>12"to18"	$15,000.00
over 18", add for each caliper inch	$1,000.00

D. Contractor shall replace any vegetation (other than trees) that died or sustained injury from the result of the Contractor's negligence to provide adequate required vegetation protection, pruning, or maintenance during the course of construction operations, as evaluated by the Owner's Representative. Compensation shall be awarded to the Owner as follows:

1. Contractor shall thoroughly remove damaged vegetation at no cost to the Owner, and at the direction of the Owner's Representative.

E. Contractor shall furnish and install per requirements in Section 329300 "Plants", with five (5) gallon container stock minimum (as applicable) of the same form, species, and in the same quantity as vegetation that was damaged, at the direction of the Owner's Representative.

F. The Owner's Representative shall make the final judgment on whether trees and/or vegetation have been damaged by the Contractor during the execution of the Work, and their decision is final.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other non-soil materials.

1. Follow Contract Requirements for environmental testing and approval of all soils prior to import to site.

2. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Ground or shredded bark.

2. Size Range: 2 inches maximum, ½ inch minimum.

3. Color: Natural.

C. Protection-Zone Fencing and Gates: As specified in Section 01 50 00.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes pre-punched and reinforced; legibly printed with non-fading lettering and as follows:

1. Size and Text: 18 x 24-inches minimum.

2. Lettering: 3-inch-high minimum, white characters on red background.

2.2 PRUNING MATERIALS

A. Pruning materials shall be in accordance with current horticultural practices.

B. Pruning sterilant shall be Physan 20 Fertilome Type A, or diluted bleach.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. Field verification: Where in the opinion of the Contractor and Inspector of Record, the excavation and/or adjacent site preparation work necessary to provide for the Contract Scope will cause damage to the tree or plant (roots), stop work in the area and contact the Arborist immediately for consultation and determination of procedure. In the event that the tree or plant is deemed necessary to be removed, the Owner shall issue a change order as required.

C. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Tie a 1-inch blue-vinyl tape around each tree trunk at 54 inches above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones as required by Arborist and other areas indicated.

1. Apply 4-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

3.3 TREE- AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.

2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.

3. Access Gates: Install as required; adjust to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 20 feet on protection-zone fencing, but no less than one sign facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

E. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.

2. Temporary access is permitted subject to pre-approval in writing by Arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Do not excavate at edge of, or within protection zones.

B. Trenching near Trees: Where utility trenches are required within protection zones, Contact District Representative for review by the Arborist and specific requirements for each condition.

C. Any trenching approved for a protected area would typically require:

1. Hand excavation under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking.

2. No cutting of main lateral tree roots or taproots;

3. Only limited cutting of smaller roots that interfere with installation of utilities and as required for root pruning.

4. Redirection of roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.

5. Exposed roots must be kept moist until placement of permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

A. Prune roots that are affected by temporary and permanent construction. Review pruning procedure and requirements with Arborist prior to the commencement of the work. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.

2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches in diameter with emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist.

3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.

4. Cover exposed roots with burlap and water regularly.

5. Backfill as soon as possible according to requirements in Division 2 Section "Earthwork."

B. Root Pruning at Edge of Protection Zone: Prune roots 12 inches outside of the protection zone, by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by Arborist.

2. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and the following:

a. Type of Pruning: Cleaning, Thinning, Raising, Reduction per Arborist's recommendation(s).

b. Specialty Pruning: Restoration, Vista, Palm, Utility per Arborist's recommendation(s).

3. Cut branches with sharp pruning instruments; do not break or chop.

4. Do not apply pruning paint to wounds.

B. Chip removed branches and incorporate into the on-site planting improvements as approved by Architect.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: District Arborist will advise on direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Submit details of proposed root cutting and tree and shrub repairs.
2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
4. Perform repairs within 24 hours.
5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 66 percent dead or in an unhealthy condition or are damaged during construction operations that Arborist determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.
2. Provide one new tree of 6-inch caliper size for each tree being replaced that measure more than 6 inches in caliper size.

a. Species: Optional species as selected by Architect or District Arborist.

3. Plant and maintain new trees as directed by the Architect or District Arborist.

C. Soil Aeration: Where directed by Arborist, aerate surface soil compacted during construction. Aerate 5 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 1-inch-diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. General product requirements.
   2. Environmental requirements for products.

B. Related Sections:
   1. Section 012500 – Substitution Procedures.
   2. Section 017300 - Execution: Protection of installed work.

1.2 BASIC PRODUCT REQUIREMENTS

A. Furnish like products from single manufacturer to greatest extent possible.

B. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.

C. Product Identifications: Nameplates, trademarks, logos, and other identifying marks on products are not permitted on surfaces exposed to view in public areas, interior or exterior. Plumbing, mechanical, and electrical equipment not exposed to public view are excluded from foregoing limitation. Required testing laboratory labels (such as UL, FM, or WH) are also excluded from foregoing limitation.

D. Domestic Products: Except where specified otherwise, provide domestic products, interpreted to mean products mined, manufactured, fabricated, or produced in United States or its territories.

1.3 SUBMITTALS

A. With record Submittals as specified in Section 017800, submit the following:
   1. Affirmative procurement Reporting Form. Submit on form in Appendix A of the Section, or similar form as approved by Owner.
   2. Submit test reports for emissions as specified in Section 018113 – LEED Requirements.
   3. Submit test reports for lethal toxic potency of smoke produced under fire conditions as specified in Section 018113 – LEED Requirements.
   4. Submit environmental data in accordance with Table 1 of ASTM E2129 for products as required within individual specification sections.

1.4 PRODUCT OPTIONS

A. Products specified by reference standards: Select any product by any manufacturer which can be shown to comply to referenced documents. Evidence of compliance will be required at time of product data or shop drawing submittals.

B. Products specified by naming several products: Select any product named.

C. Acceptable Product: The term as used in these Specifications is to assist the user in locating the specified product and is not intended to denote sole source for product specified. The acceptable product listed denotes a typical product by one of listed acceptable manufacturers. Products by other listed manufacturers meeting or exceeding listed product or specified criteria may be used without following substitution procedures.

D. Products specified by naming one manufacturer's model or performance criteria with reference to other acceptable or approved manufacturers: Products of other listed manufacturers must meet or exceed model number or criteria specified. Equivalent products by other listed manufacturers may be used without following substitution procedures.

E. Products specified by naming one product or indicating option of selecting equivalent products by stating "equivalent to," "or other approved manufacturers," or other similar language: Submit "Substitution Request Form" for any product not specifically named.

F. Products specified by naming only one product followed by "no substitutions," or other similar language: There is no option.

1.5 ENVRIONMENTALLY PREFERABLE PRODUCTS

A. Provide environmentally preferable products to the greatest extent possible.

B. Provide products and materials that promote stewardship of the earth's resources, promote good indoor environmental quality (IEQ), and promote efficiencies in operational performance. Environmentally preferable products:
   1. Preserve or renew biodiversity and ecosystems.
   2. Maximize use of biobased and recycled content materials.
   3. Maintain or improve water quality and promote water stewardship.
   4. Maximize use of non-toxic, non-hazardous, healthy and safe building materials.

1.6 PRODUCT DELIVERY REQUIREMENTS

A. Arrange deliveries in accordance with construction progress schedules. Schedule deliveries to allow adequate time for product inspection prior to installation. Schedule shall also take into consideration and allow adequate time for reordering of products damaged during delivery or do not meet Contract requirements.

B. Coordinate to avoid conflict with Work and conditions at site.

C. Deliver products in undamaged condition, in manufacturer's original unopened containers or packaging, with identifying labels intact and legible.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

1.7 PRODUCT STORAGE, AND HANDLING REQUIREMENTS

A. Storage:
   1. Store and protect products in accordance with manufacturer's instructions with labels intact and legible.
   2. Store environmentally sensitive products in weathertight, climate controlled enclosures.
   3. Provide off site storage and protection when site does not permit on site storage.
   4. Protect and cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
   5. Arrange storage to permit access for inspection. Periodically inspect to ensure products are undamaged and are maintained under specified conditions.
   6. Store loose granular materials on solid flat surfaces in well-drained area. Prevent contamination with other materials.

B. Handling:
   1. Handle products in accordance with manufacturer's instructions.
   2. Do not load structure during construction by storing products with load greater than structure is calculated to safely support.
   3. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

C. Mold Prevention: Take precautions in delivery, handling, and storage of mold growth products to keep them dry until time of installation.
   1. Refer to Section 014000 for definition of Mold Growth Products.
   2. Only install clean and dry mold growth products.
   3. Remove wet or dirty mold growth products from project site.

D. Do not use products in Work which have deteriorated, become damaged, or are otherwise unfit for use.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 PRODUCT INSTALLATION

A. Refer to Section 017300 - Execution.

END OF SECTION

SECTION 017123

FIELD ENGINEERING

PART 1 - GENERAL

1.1 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Submit following informational submittals:
   1. Name, address, and telephone number of Surveyor before starting survey work.
   2. On request, documentation verifying accuracy of survey work.

C. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Project record documents:
      a. Submit copy of surveyor's log.
      b. Submit 6 copies of final property survey for Owner's records.

1.2 QUALITY ASSURANCE

A. Employ Land Surveyor registered to perform surveying in State where project is located, acceptable to Owner and Architect.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 SURVEY REFERENCE POINTS

A. Control datum is indicated on Drawings.

B. Establish and maintain minimum of 2 permanent bench marks on site, referenced to established control points. Record locations with horizontal and vertical data on Project Record Documents.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Do not change or relocate benchmarks or control points without prior written approval of Architect.

E. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect. Base replacements on original survey control points.

G. Existing Utilities and Equipment:
   1. Existence and location of indicated existing underground utilities and construction are not guaranteed.
   2. Before beginning sitework:
      a. Investigate and verify existence, location, and elevations of underground utilities and other construction.
      b. Verify location and invert elevation at points of connection for sanitary sewer, storm sewer, and water-service piping.
   3. Furnish information necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other appurtenances located in or affected by construction.
   4. Coordinate with local authorities having jurisdiction.

3.2 SURVEY REQUIREMENTS

A. Establish building location and layout on site. Establish and verify each floor elevation. Establish layout, lines, and elevation of Work based on established datum.

B. Work from lines and levels established by property survey.

C. Establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.

D. Calculate and measure required dimensions within indicated or recognized tolerances.

E. Do not scale Drawings to determine dimensions.

F. Advise entities engaged in construction activities of marked lines and levels provided for their use.

G. Establish elevations, lines, and levels. Locate, lay out, and periodically verify layouts, by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; and utility locations, slopes, and invert elevations;
   2. Grid or axis for structures.
   3. Building foundation, column locations, and ground floor elevations.

H. As construction proceeds, check every major element for line, level, and plumb.

I. Surveyor's Log:
   1. Maintain and make available for references, surveyor's log of control and other survey work as work progresses. Make this log available for reference.
   2. Record deviations from required lines and levels, and advise Architect of deviations exceeding indicated or recognized tolerances.
   3. Record deviations on Project Record Drawings that are accepted and not corrected.

3.3 FINAL PROPERTY SURVEY

A. Prior to Substantial Completion, prepare a final property survey illustrating locations, dimensions, angles, and elevations of buildings and site work that have resulted from construction of Project indicating their relationship to permanent bench marks and property lines.

B. Show significant features (real property) for Project.

C. Include certification on survey, signed by surveyor, that principal metes, bounds, lines, levels, and elevations of Project are accurately shown.

END OF SECTION

SECTION 017300

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 016000 - Product Requirements: Basic Product Requirements.

1.2 EXAMINATION OF CONDITIONS

A. Examine substrates and conditions under which Work is to be performed. Do not commence work over unsatisfactory conditions detrimental to proper and timely execution of Work.

B. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. Commencement of installation constitutes acceptance of conditions and cost of any corrective measures are responsibility of Contractor.

1.3 PREPARATION

A. Require compliance with manufacturer's printed installation instructions, including each step in sequence. Do not omit preparatory steps or installation procedures unless specifically modified or exempted by Contract Documents.

B. Maintain one set of complete instructions at Project site during installation and until completion.

C. Should Project conditions or specified requirements conflict with manufacturer's instructions, request clarification in writing from Architect before proceeding.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 PRODUCT EXECUTION

A. Install, erect, connect, condition, use, adjust, and clean products in accordance with manufacturer's instructions and in conformity with specified requirements.

B. Verify and coordinate clearances, dimensions and installation of adjoining construction, equipment, piping, ducts, conduits, or other mechanical or electrical items or apparatus.

C. Prior to fabrication, field measure actual existing conditions to ensure proper fit.

D. Inspect each item of material or equipment immediately prior to installation. Reject damaged and defective items.

E. Recheck measurements and dimensions of Work, as an integral step of starting each installation. Whenever stock manufactured products are specified, verify actual space requirements for setting or placing into allotted space. No extra cost will be allowed for adjustment of Work to accommodate particular product.

F. Provide attachment and connection devices and methods for securing Work. Secure in place with devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

G. Allow for expansion of materials and building movement.

H. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration and electrolytic action.

I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components to ensure operability without damaging effects.

J. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.2 PROTECTION OF INSTALLED WORK

A. Protect installed Work in manner to prevent damage from subsequent construction operations.

B. Provide special protection where specified in individual Specification sections.

C. Provide temporary and removable materials for protection of installed products. Control activity in immediate work area to minimize damage.

D. Ensure materials, systems, and components will be without damage or deterioration at time of Substantial Completion.

E. Protect finished Work from damage, defacements, stains, scratches, and wear.

F. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

G. Protect finished floors, stairs, and other surfaces from traffic dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

H. Mold Prevention:
   1. Provide protection to keep mold growth products dry during construction operations until time of Substantial Completion.
   2. Provide temporary protection if permanent protection is not provided in timely manner by sequencing and scheduling of construction operations.

I. Remove or repair damaged items. Remove products exhibiting mold growth.

J. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

K. Prohibit traffic from lawn and landscaped areas.

END OF SECTION

SECTION 017329

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes incidental cutting, fitting, and patching within new construction required to complete work or to make its several parts fit together.

B. Related Sections:
   1. Section 078400 - Firestopping.

1.2 SUBMITTALS

A. Submit written request to perform cutting and patching 2 weeks in advance of cutting or alteration which affects:
   1. Structural value or integrity of any element of Project.
   2. Integrity or effectiveness of weather exposed or moisture resistant elements or systems.
   3. Efficiency, operation, maintenance, or safety of operational equipment.
   4. Visual qualities of elements exposed to view.

B. Include in request:
   1. Identification of Project.
   2. Location and description of affected Work.
   3. Description of proposed Work:
      a. Scope of cutting, fitting, patching, or alteration.
      b. Listing of applicable trades.
      c. Proposed products and materials.
      d. Extent of refinishing.
   4. Necessity for cutting or alteration.
   5. Alternatives to cutting and patching.
   6. Effect on structural integrity of Work.
   7. Effect on weatherproof integrity of Work.
   8. Effect on the building's appearance and significant visual elements.
   9. Effect on utilities:
      a. List utilities affected by cutting and patching.
      b. List utilities that will be relocated.
      c. List utilities that will be temporarily out-of-service. Indicate time period of service outage.
   10. Date and time of execution.

C. Should conditions or schedule require change of products or methods different than original installation, submit written recommendation to Architect explaining conditions necessitating change and requirements of alternative materials or methods.

D. Approval by Architect to proceed with cutting and patching does not waive Architect's right to later require complete removal and replacement of unsatisfactory work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Primary Products and Materials: Those required for original installation; comply with Specifications for each specific product involved.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Comply with provisions of Section 017300.

B. After uncovering existing Work, examine conditions affecting installation of products and performance of Work.

3.2 PREPARATION

A. Provide temporary supports to ensure structural integrity of affected portions of Work.

B. Provide devices and methods to protect other portions of Project from damage.

C. Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

D. Provide materials and control operations to prevent spread of dust in surrounding area. Provide drop cloths or other suitable barriers.

E. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Avoid cutting in service pipes, ducts, or conduit until provisions have been made to bypass them.

3.3 PERFORMANCE

A. Cut into construction to provide for installation of other Work and subsequent fitting and patching required to restore surface to original condition.

B. Cut, fit, patch, excavate, and backfill to complete Work and to:
   1. Fit several parts together, to integrate with other work.
   2. Uncover portions of work to provide for installation of ill-timed work.
   3. Remove and replace defective work.
   4. Remove and replace work not conforming to requirements of Contract Documents.
   5. Remove samples of installed work as necessary for testing.
   6. Provide openings in elements of work for penetrations of plumbing, mechanical, and electrical work.
   7. Uncover work to allow for Architect's observation of covered work which has been covered up prior to required observation by Architect.

C. Execute in manner which does not void required or existing warranties.

D. Execute by methods which will prevent damage to other Work and which will produce appropriate surfaces to receive installation of new Work:
   1. Use hand or small power tools designed for sawing or grinding, not hammering or chopping.
   2. Cut holes and slots as small as possible, neatly to size required, with minimum disturbance of adjacent surfaces.
   3. Temporarily cover openings when not in use.
   4. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed surfaces.
   5. Cut through concrete and masonry using cutting machine, such as Carborundum saw or diamond-core drill.

E. Execute excavating and backfilling by methods in accordance with applicable Sections of Division 31 which will prevent settlement or damage to Project.

F. Execute fitting and adjustment to produce finished installation complying with specified products, functions, tolerances, and finishes.

G. Restore surfaces which have been cut, removed, or damaged, to match existing conditions.

H. Install products and materials to complete Work in accordance with requirements of Contract Documents.

I. Employ original installer to perform cutting and patching for weather exposed and moisture resistant elements, and sight exposed surfaces.

J. Do not cut and patch structural elements in manner that would result in reduction of load carrying capacity or of load deflection ratio.

K. Do not cut and patch operational elements or safety related components in manner that would result in reduction of their capacity to perform in manner intended, including energy performance, that would result in increased maintenance, decreased operational life, or decreased safety.

L. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

M. At penetrations of fire-rated assemblies, completely seal with firestops in accordance with Section 078400.

N. Where utilities are to be removed, relocated, or abandoned, by-pass before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe, duct, or conduit to prevent entrance of moisture or matter after by-passing and cutting.

O. Except where indicated otherwise, restore exposed finishes of patched areas to match adjacent surface and where necessary extend finish restoration into adjacent surfaces in manner which will eliminate evidence of patching and refinishing. Thoroughly clean surfaces prior to application of paint and other finishes.

P. Where patching occurs in previously painted surface, provide appropriate prime coat followed by first finish coat of paint. Provide final finish coat over entire area containing patch; for continuous surface extend to nearest vertical break or intersection, for an assembly refinish entire unit. Except where indicated otherwise, finish in sheen and color to match existing.

3.4 CLEANING

A. Thoroughly clean areas and spaces affected by Work. Completely remove paint, mortar, oils, putty, and items of similar nature.

B. Restore damaged surfaces to its original condition.

END OF SECTION

SECTION 017400

CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Construction and final cleaning prior to Certification of Substantial Completion.
   2. Recycling nonhazardous demolition and construction waste.
   3. Disposing of nonhazardous demolition and construction waste.

1.2 SYSTEM DESCRIPTION

A. Execute cleaning during progress of work and at completion of work as required by this section and the Conditions of the Contract.

B. Hazards Control:
   1. Store volatile wastes in covered safety containers.
   2. Remove containers from premises daily.
   3. Prevent accumulation of waste which creates hazardous conditions.
   4. Provide adequate ventilation during use of volatile or noxious substances.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
   1. Do not burn or bury rubbish and waste materials on Project site.
   2. Do not dispose of volatile wastes or hazardous materials such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
   3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Utilize non-toxic cleaning materials and methods.
   1. Comply with Green Seal GS 37 for general purpose cleaning and toilet room cleaning.
   2. Use natural cleaning materials where feasible. Natural cleaning materials include.
      a. Abrasive cleaners: substitute 1/2 lemon dipped in borax.
      b. Ammonia: substitute vinegar, salt and water mixture, or baking soda and water.
      c. Disinfectants: substitute 1/2 cup borax in gallon water.
      d. Drain cleaners: substitute 1/4 cup baking soda and 1/4 cup vinegar in boiling water.
      e. Upholstery cleaners: substitute dry cornstarch.

B. Use only materials and methods recommended by manufacturer of material being cleaned.

C. Do not use materials which will create hazards to health or property, or which will damage surfaces.

D. Provide covered containers for deposit of waste materials, debris, and rubbish.

PART 3 - EXECUTION

3.1 CLEANING DURING CONSTRUCTION

A. Execute periodic cleaning to keep building, site, and adjacent properties free of accumulations of waste materials, debris, rubbish, and wind blown debris resulting from construction operations.

B. Prior to Substantial Completion remove construction tools, scaffolding, equipment, machinery, and surplus materials.

C. Broom clean and vacuum interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Schedule cleaning operations so that dust and other contaminants will not fall on or adhere to wet or newly-coated surfaces.

E. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing space.

F. Do not throw materials from heights.

G. Open free-fall chutes not permitted. Terminate closed chutes into appropriate containers with lids.

3.2 FINAL CLEANING

A. Comply with ASTM E1971 Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings and manufacturer's instructions.

B. Remove tools, construction equipment, machinery, and surplus material from Project site.

C. Employ experienced personnel or professional cleaning firm.

D. Cleaning:
1. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of stains, films, and similar foreign substances.
2. Remove labels which are not required as permanent labels.
3. Clean glossy materials to polished condition; remove foreign substances.
4. Polish reflective surfaces to clear shine.
5. Restore existing reflective surfaces to their original condition.
6. Glass and glazing:
   a. Wash and clean mirrors and both sides of glass.
   b. Remove putty and other substances which obscure vision.
   c. Replace chipped, scratched, and broken glass.
7. Clean concrete floors in unoccupied spaces.
8. Clean resilient flooring, stone flooring, tile, pavers, and other similar hard-surface flooring, including associated bases. Refer to individual Specification sections for requirements of sealing, buffing, waxing, and polishing.
9. Clean carpet and similar soft surfaces, removing debris, soil, and excess nap.
10. Clean exposed surfaces of equipment; remove excess lubrication.
11. Clean plumbing fixtures, drinking fountains, and similar equipment to sanitary condition.
12. Clean light fixtures and lamps; replace burned-out lamps.

E. Avoid disturbing natural weathering of exterior surfaces.

F. Heating, Ventilating, and Air Conditioning Systems:
1. Clean permanent filters and replace disposable filters for units operated during construction.
2. Clean ducts, blowers, and coils for units operated without filters during construction.

G. Site:
1. Clean areas disturbed by construction activities, including landscape areas, free of rubbish, litter and foreign substances.
2. Sweep paved areas to broom clean condition.
3. Remove stains, spills, and other foreign deposits.
4. Rake grounds that are neither paved nor planted to even-textured surface.

H. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.

I. Prior to final completion, conduct inspection of sight-exposed interior surfaces, exterior surfaces, and associated work areas to verify that entire Work is clean.

J. Maintain cleaning until Project, or portion thereof, is accepted by Owner.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General:
1. Comply with Cal-GREEN Section 5.408 for waste management plan and 50% minimum recycling or salvage for reuse of non-hazardous construction and demolition debris or waste, unless local requirements of Authorities Having Jurisdiction are more stringent.
2. Collect and remove waste materials, debris, and rubbish from site until execution of final cleaning.
3. Handling:
   a. Clean materials that are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
   b. Arrange for collection by or delivery to the appropriate recycling or reuse facility.

B. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
      a. Inspect containers and bins for contamination and remove contaminated materials if found.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   4. Store components off the ground and protect from the weather.
   5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of trash not suitable for recycling.

END OF SECTION

SECTION 017500

STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Perform operations in following order prior to request for Substantial Completion:
   1. Starting of Systems
   2. Demonstration of Systems
   3. Instruction of Owner's designated personnel.

B. Related Sections:
   1. Section 015000 - Temporary Facilities and Controls: Temporary use of permanent systems prior to Substantial Completion.
   2. Section 017800 - Closeout Submittals: Operations and maintenance manuals, and warranties and bonds.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Submit following items as required by this Section:
   1. Systems Startup Report.
   2. Commissioning Report.
   3. Record of Owner's Instructions.

1.3 STARTING OF SYSTEMS

A. Coordinate schedule for startup of various equipment and systems.

B. Notify Architect and Owner at least 7 days prior to startup of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by contract documents and equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute startup under supervision of applicable manufacturer's representatives and Contractor's personnel in accordance with manufacturer's instructions.

G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to startup, and to supervise placing equipment or system in operation.

H. Submit manufacturer's field report in accordance with Section 014000 stating that equipment or system has been properly installed and is functioning correctly.

1.4 TESTING, ADJUSTING, AND BALANCING (TAB)

A. Refer to Division 23 specification section on testing, adjusting, and balancing.

B. TAB firm will perform services specified in Division 23 prior to demonstration of system to Owner.

C. Submit reports by TAB firm, in accordance with Section 014500, to Architect indicating observations and results of tests and indicating compliance or non-compliance with Contract Document requirements.

1.5 DEMONSTRATION

A. Demonstration is for verification that systems will start and operate properly.

B. Demonstrate systems operation to Owner's personnel prior to performing instruction of Owner's personnel.

C. Demonstrate Project equipment by qualified manufacturers' representative who is knowledgeable about Project requirements and operation and maintenance of equipment being demonstrated.

D. For equipment or systems requiring seasonal operation, perform demonstration for other season within 6 months.

E. Demonstrate startup, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment.

F. Prepare and insert additional data in operations and maintenance manuals required by Section 017800 when need for additional data becomes apparent during instruction.

1.6 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to Substantial Completion, fully instruct Owner's designated operation and maintenance personnel in operation, adjustment, and maintenance of products, equipment and systems requiring regular maintenance. Perform instructions within continuous period of 30 days. For equipment that requires seasonal operation, provide similar instruction during other seasons.

B. Arrange and pay for services of qualified manufacturer's representatives to fully instruct Owner on specialized portions of installation, such as refrigeration machines, automatic controls, water treatment, and electrical systems.

C. Use operations and maintenance manual as basis of instruction. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance. Include detailed review of following items:
   1. Maintenance manuals.
   2. Record documents.
   3. Spare parts and materials.
   4. Tools.
   5. Lubricants.
   6. Fuels.

D. Submit complete record of instructions as part of operations and maintenance manual given to Owner. For each instructional period, supply following data:
   1. Date.
   2. System or equipment involved.
   3. Names of persons giving instructions.
   4. Other persons present.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 015000 - Temporary Facilities and Controls: Temporary use of permanent systems prior to Substantial Completion.
   2. Section 017500 - Starting and Adjusting: Starting of systems, testing and balancing, demonstrations, and instruction of Owner's personnel.

1.2 PREREQUISITES TO SUBSTANTIAL COMPLETION

A. Complete items in following paragraphs before requesting Certification of Substantial Completion, either for entire Work or for portions of Work.

B. Conduct inspection to substantiate basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or non-conforming work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.

C. Submit statement showing accounting of changes to Contract Sum.

D. Advise Owner of pending insurance change-over requirements at final payment.

E. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.

F. Submit project record documents in compliance with Section 017800, maintenance manuals, digital images of construction photographs, and other similar final record data.

G. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.

H. Make final change-over of locks eliminating construction masterkey system and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.

I. Comply with requirements of Section 015000 for restoring permanent systems operated prior to Substantial Completion.

J. Complete facility startup of systems and equipment, demonstrations, and instructions to Owner's operating and maintenance personnel as specified in Section 017500.

K. Discontinue or change over and remove temporary facilities and services from Project site, along with construction tools, mock-ups, and similar elements.

L. Perform final cleaning in accordance with Section 017400.

M. Touch-up and otherwise repair and restore marred exposed finishes.

1.3 SUBSTANTIAL COMPLETION REVIEW

A. When Contractor considers Work to be substantially complete, submit to Architect:
   1. Written certificate that Work, or designated portion, is substantially complete.
   2. List of items to be completed or corrected (initial punch list).

B. Within 7 days after receipt of request for Substantial Completion, Architect will make site review to determine whether Work or designated portion is substantially complete following procedures indicated in Conditions of the Contract.

C. Should Architect determine that Work is not substantially complete:
   1. Architect will promptly notify Contractor in writing, stating reasons for its opinion.
   2. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Architect.
   3. Architect will re-perform review of Work.

D. When Architect finds that Work is substantially complete, Architect will:
   1. Prepare Certificate of Substantial Completion on AIA Form G704, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Architect and Owner (final punch list). If Contractor fails to generate initial punch list, or if Architect adds more than 500 items to Contractor's list, or ten or more items per room on average, Owner will reimburse Architect for time spent in adding to or generating list, and will deduct amount of compensation from payment to Contractor.
   2. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate.

E. After Work is substantially complete, Contractor shall:
   1. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
   2. Complete work listed for completion or correction within time period stipulated.

1.4 PREREQUISITES FOR FINAL COMPLETION

A. Complete items in following paragraphs before requesting final acceptance and final payment. List known exceptions, if any, in request.

B. When Contractor considers Work to be complete, submit written certification that:
   1. Contract Documents have been reviewed.
   2. Work has been examined for compliance with Contract Documents.
   3. Work has been completed in accordance with Contract Documents.
   4. Work is completed and ready for final inspection.

C. Submit final punch list indicating all items have been completed or corrected.

D. Submit final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

E. Submit specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents in accordance with Section 017800.

F. Submit updated accounting statement for final changes to Contract Sum.

G. Submit consent of surety to final payment.

H. Perform final cleaning for Contractor soiled areas in accordance with Section 017400.

1.5 FINAL COMPLETION REVIEW

A. Within 7 days after receipt of request for final review, Architect will make site review to determine whether Work or designated portion is complete following procedures indicated in Conditions of the Contract.

B. Should Architect consider Work to be incomplete or defective:
   1. Architect will promptly notify Contractor, in writing, listing incomplete or defective work.
   2. Contractor shall take immediate steps to remedy stated deficiencies and send second written request to Architect that Work is complete.
   3. Architect will reinspect Work.

1.6 REVISITS FOR SITE REVIEWS

A. Should Architect have to re-perform site reviews due to failure of Work to comply with claims of completion made by Contractor, Owner will reimburse Architect for such additional services and will deduct amount of compensation from final payment to Contractor.

1.7 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

A. Submit Contractor's affidavit of Payment of Debts and Claims on AIA Document G706.

B. Submit Contractor's affidavit of Release of Liens on AIA Document G706A with:
   1. Consent of Surety to Final Payment: AIA G707.
   2. Contractor's Release or Waiver of Liens.
   3. Separate releases or waivers of liens from subcontractors, suppliers and others with lien rights against property of Owner, together with list of those parties.

C. Execute submittals before delivery to Owner.

1.8 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit final statement of accounting to Architect.

B. Show adjustments to Contract Sum:
   1. Original Contract Sum.
   2. Additions and deductions resulting from:
      a. Previous Change Orders.
      b. Allowances.
      c. Unit Prices.
      d. Deductions for uncorrected Work.
      e. Deductions for inspection payments.
      f. Other adjustments.
   3. Total Contract Sum as adjusted.
   4. Previous payments.
   5. Retainage.
   6. Sum remaining due.

C. Architect will prepare final Change Order reflecting approved adjustments to Contract Sum which are not included in Change Orders previously processed.

1.9 FINAL APPLICATION FOR PAYMENT

A. Submit final Application for Payment in accordance with procedures and requirements stated in Conditions of the Contract.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 017800

CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 RECORDING

A. Post changes and modifications to record documents as they occur. Do not wait until end of Project. Architect will periodically review record documents to assure compliance with this requirement.

1.2 SUBMITTAL

A. Deliver closeout submittals and samples to Architect for transmittal to Owner.

B. Include typed list identifying each item submitted as closeout document.

1.3 OPERATIONS AND MAINTENANCE MANUALS

A. Prepare data in form of instructional manual in heavy-duty three-ring binders with durable plastic covers.
   1. Where written instructions are required, use personnel skilled in technical writing to extent necessary for communication of essential data.
   2. Where drawings or diagrams are required, use personnel capable of preparing drawings clearly in understandable format.

B. Examine for completeness.

C. Submit one copy of completed volumes in final form after instructing Owner's personnel under Section 017500, but prior to request for Substantial Completion. This copy will be returned with Architect's comments. Revise as necessary prior to final submittal.

D. Prepare and insert additional data in manuals when need for such data becomes apparent during Owner's instruction.

E. Submit 3 copies of final volumes at time of request for Substantial Completion.

F. Label covers and spine of each binder with typed or printed title OPERATIONS AND MAINTENANCE MANUAL, title of project, and subject matter of binder when multiple binders are required.

G. Separate contents with tab dividers, logically organized with tab title clearly printed under reinforced laminated plastic tabs.

H. Manuals shall contain:
   1. Table of contents.
   2. Directory listing names, addresses, and telephone numbers of Architect, Engineer, and Contractor.
   3. List names, addresses and telephone numbers of subcontractors, suppliers, and service representatives, including local source of supplies and replacement parts.
   4. General system or equipment description.
   5. Copies of applicable shop drawings and product data.
   6. Mark product data to clearly identify specific products and component parts.
   7. Supplement product data with drawings necessary to illustrate relationship of component parts of equipment and systems, include control and flow diagrams.
   8. Arranged by product, system, or process flow, and subdivided by Specification section. Identify following:
      a. Significant design criteria.
      b. List of equipment.
      c. System or equipment identification, including:
         1) Name of manufacturer.
         2) Model number.
         3) Serial number of each component.
      d. Parts list for each component.
      e. Operating instructions.

f. Maintenance instructions and schedules for equipment and systems.
g. Emergency instructions.
h. Wiring and piping diagrams.
i. Inspection and test procedures.
j. Precautions against improper use and maintenance.

9. Copies of warranties.
10. Protective plastic jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
11. Text material:
    a. Provide manufacturer's standard printed material or typewritten specially prepared data.
    b. Provide text on 8-1/2 inches by 11 inches, 20 pound white bond paper.
12. Drawings and diagrams:
    a. Provide reinforced punched binder tabs on drawings and bind in with text.
    b. Oversize drawings:
        1) Fold drawings to same size as text pages and use as fold-out.
        2) Drawings too large to be used as fold-out, place folded drawing in front or rear pocket of binder. Insert typewritten page indicating drawing title, description of contents, and drawing location at appropriate location in manual.

I. Environmental Requirements:
1. Identify environmentally preferable materials and systems incorporated into the Project. Include: product model; manufacture's name, address, phone, and website; and local technical representative, if any.
    a. Verify that plastic products to be incorporated into the Project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in Operation and Maintenance Manual
        1) Type 1: Polyethylene Terephthalate (PET, PETE).
        2) Type 2: High Density Polyethylene (HDPE).
        3) Type 3: Vinyl (Polyvinyl Chloride or PVC).
        4) Type 4: Low Density Polyethylene (LDPE).
        5) Type 5: Polypropylene (PP).
        6) Type 6: Polystyrene (PS).
        7) Type 7: Other. Use of this code indicates that the package in question is made of resin other that the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.
    b. Describe maintenance procedures associated with environmentally preferable materials and systems. Provide cleaning recommended in accordance with ASTM E1971.
        1) Include potential environmental impacts of recommended maintenance procedures and materials.
        2) Include potential indoor air quality impacts of the recommended maintenance procedures and materials.
        3) Where the proposed maintenance procedures incorporate composting of plastics, assess and the potential effect of each type of plastic to be included on the composting process in accordance with ASTM D5509 or ASTMD5512.
    c. Identify [maintenance agreements] [take-back programs] [green leases] and appropriate contact information for the following:
        1) Carpet.
        2) Ceiling Tile.
        3) Office Equipment.
    d. Material Safety Data Sheet: Include MSDS as specified in Section 018113 and in product specifications.
2. Develop environmental management programs for the facility as follows:
    a. Waste management program: Develop in accordance with ASTM E1609. Maximize use of source reduction and recycling procedures outline in ASTM D5834.

b. IAQ management program: Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D6245. Provide for evaluation of VOCs (volatile organic compounds) in indoor air in accordance with ASTM D6345.
c. Water management program: Develop a water monitoring program for surface and ground water on the project site in accordance with ASTM D5851 and consistent with the water management program utilized during construction operations.

1.4 MATERIAL AND FINISHES MAINTENANCE MANUAL

A. Manual:
1. Submit 3 copies of each manual, in final form, on material and finishes to Architect for distribution.
2. Provide one section for interior products, including applied materials and finishes, and second for products designed for exterior products.

B. Interior Products:
1. Provide manufacturer's data and instructions on care and maintenance of architectural products, including applied materials and finishes.
2. Product data: Provide complete information on architectural products, including following, as applicable:
   a. Manufacturer's catalog number.
   b. Size.
   c. Material composition.
   d. Color.
   e. Texture.
   f. Reordering information for specially manufactured products.
3. Care and maintenance instructions: Provide information on care and maintenance including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning. Provide information regarding cleaning agents and methods that could prove detrimental to product. Include manufacturer's recommended schedule for cleaning and maintenance.

C. Exterior Products:
1. Provide complete manufacturer's data with instructions on inspection, maintenance, and repair of products exposed to weather or designed for moisture-protection purposes.
2. Manufacturer's data: Provide manufacturer's data giving detailed information, including following, as applicable.
   a. Applicable standards.
   b. Chemical composition.
   c. Installation details.
   d. Inspection procedures.
   e. Maintenance information.
   f. Repair procedures.

1.5 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide tools, spare parts, maintenance and extra stock materials in quantities specified in individual Specification sections.

B. Deliver to Project site and place in locations as directed; obtain receipt from subcontractors and suppliers.

C. Submit letter at time of inspection for Substantial Completion listing items and quantities; attach receipts.

1.6 WARRANTIES AND BONDS

A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on Work that incorporates products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with Contractor.

B. Owner's Recourse:
1. Written warranties made to Owner are in addition to implied warranties, and shall not limit duties, obligations, rights and remedies otherwise available under law.

2. Warranty periods shall not be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights, or remedies.
3. Rejection of warranties: Owner reserves right to reject warranties and to limit selections to products with warranties not in conflict with requirements of Contract Documents.

C. Submit 3 copies of warranties, maintenance bonds, and maintenance/service contracts as specified in various Specification sections. Include one copy of each warranty in Operations and Maintenance Manual, or in Material and Finishes Maintenance Manual.

D. Assemble data in heavy-duty three-ring binders with durable plastic covers, two required.

E. Label cover and spine of each binder with typed or printed title WARRANTIES AND BONDS and title of Project.

F. Prepare table of contents in sequence of table of contents of Project Manual, with each item identified with number and title of Specification section in which specified, and name of product or work item.

G. Separate each warranty, bond, or service contract with tab and index sheets keyed to listing in table of contents. Provide full information, using separate typed sheets as necessary. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

H. Obtain warranties, bonds, and maintenance/service contracts executed in triplicate by responsible subcontractors, suppliers, and manufacturers; warranties commence on Date of Substantial Completion.

I. Verify that documents are in proper form, contain full information, and are notarized.

J. Time of Submittals:
1. Submit binders containing warranties, bonds, and maintenance/service contacts within 10 days after date of Substantial Completion.
2. For equipment or component parts of equipment put into service during construction with Owner's permission, submit photo copies of documents within 10 days after acceptance listing date of acceptance as beginning of warranty period. Retain originals of executed documents for final submittal as indicated in subparagraph above.
3. For items of Work when acceptance is delayed beyond date of Substantial Completion, submit within 10 days after acceptance listing date of acceptance as beginning of warranty period.

1.7 RECORD DOCUMENT REQUIREMENTS

A. Maintain at Project site record copy of:
1. Project Manual.
2. Contract Drawings.
3. Addenda.
4. Change Orders, Change Directives, Supplemental Instructions, and other modifications to Contract.
5. Approved shop drawings, product data, samples, and similar required submittals.
6. Approved substitutions.
7. Reports of inspection and testing agencies.
8. Inspection certificates.
9. Manufacturer's certificates, manufacturer's instructions, and reports of manufacturer's field observations.
10. Samples.
11. Other items indicated in various sections within Division 01.

B. Environmental Record Documents: As specified in Specifications and as follows.
1. Final Summary of Solid Waste Disposal And Diversion.
2. Construction Indoor Air Quality (IAQ) Reports.
3. Affirmative Procurement Reporting Form:
4. Environmental Product Data:
5. Life Cycle Assessment (LCA) Data:
6. Chain-of-Custody Data:
7. Commissioning Report:

C. Obtain from Architect and pay reproduction costs for one set of hardcopy Contract Drawings for recording changes and modifications.

D. Obtain from Architect and pay reproduction costs for one set of Project Manuals for record purposes.

E. Store record documents and samples in field office apart from documents used for construction. Provide files and racks for secure storage.

F. Label and file documents and samples in accordance with section number listings in Table of Contents of Project Manual. Label each item PROJECT RECORD DOCUMENT in stamped or printed letters in prominent location on each Drawing.

G. Maintain documents and samples in clean, dry, legible condition; do not use for construction purposes.

H. Record information concurrently with construction progress.

I. Make documents available for review by Architect and Owner during construction period.

1.8 CONTRACT DRAWINGS AND SHOP DRAWINGS

A. Legibly mark drawings to record actual construction which varies appreciably from Contract Documents. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:
   1. Dimensional changes to Drawings.
   2. Measured depths of foundation below first floor datum.
   3. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
   5. Revisions to routing of piping and conduits.
   6. Revisions to electrical circuitry.
   7. Actual equipment locations.
   8. Duct size and routing.
   9. Revisions to details shown on Drawings.
   10. Details not on original Contract Drawings.
   11. Changes made by addenda, change orders, change directives, supplemental instructions, and other issued modifications.
   12. References to related shop drawings and other similar detailed modifications.

B. Mark-up Procedures:
   1. Mark completely and accurately record prints of Contract Drawings or shop drawings, whichever is most capable of showing actual physical conditions. Where shop drawings are marked, show cross-reference on Contract Drawings location.
   2. Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of Work at same location.
   3. Mark important additional information which was either shown schematically or omitted from original Drawings.
   4. Record modifications caused by Supplemental Instructions, Construction Change Directives, Change Orders, Alternates, and similar modifications.
   5. Accurately record information using understandable technique.
   6. Record data as soon as possible after it has been obtained. In case of concealed installations, record and check mark-up prior to concealment.
   7. At time of Substantial Completion, submit Record Drawings to Architect for Owner’s records. Organize into sets, bind and label sets for Owner’s continued use.

C. Preparation of Submittal:
   1. Immediately prior to request for Substantial Completion, review completed marked-up Record Drawings with Architect.
   2. When authorized, prepare full set of corrected Contract Drawings and shop drawings.

3. Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each Record Drawing.

D. Review of Record Set:
1. Before copying and distributing, submit corrected original marked-up prints to Architect for review.
2. When acceptable, Architect will initial and date each record original, indicating acceptance of general scope of changes and additional information recorded, and of quality of drafting.
3. Original marked-up prints will be returned to Contractor for organizing into sets, printing, binding and final submittal.

E. Copies and Distribution:
1. After completing preparation of Record Drawings, print 3 copies of each Record Drawing, and make PDF digital copies whether or not changes and additional information were recorded.
2. Organize copies into manageable sets.
3. Bind each set with durable paper cover sheets, with appropriate identification, including titles, dates and other information on cover sheets.
4. Organize and bind original marked-up set of prints that were maintained during construction period in same manner.
5. Organize record drawings into sets. Place original set in durable tube-type drawing containers with end caps. Mark end cap of each container with suitable identification.
6. Submit marked-up record set, digital PDF copies, and prints to Architect for Owner's records; Architect will retain one copy set.

1.9 PROJECT MANUALS

A. Legibly record changes and modifications issued by addenda and change orders. Make PDF copies of record specifications.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 018113

LEED REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

A. The project building shall be registered with the USGBC for LEED certification by the project's LEED consultant, with a target of LEED Silver per LEED for New Construction v2009.

B. All team members shall be responsible for compliance with their LEED credits as indicated in **Appendix A** (710 Wilshire Blvd. LEED NC Scorecard). The responsible discipline is indicated for each LEED credit. All team members shall comply with all requirements as stated in the LEED Building Design + Construction v2009 Reference Guide (with Addenda) for their assigned credits.

C. Unless directed otherwise, the credits indicated as "Yes" credits in **Appendix A** are considered to be required. Unless directed otherwise, items indicated as "Bid Alt" are considered to be bid alternates and the responsible discipline is required to provide an alternate design or construction bid for 710 Wilshire Blvd to evaluate prior to contract execution.

D. All team members are responsible for completing LEED templates that pertain to their discipline.

APPENDIX A

710 WILSHIRE BLVD. LEED NC SCORECARD

"Yes" Indicates LEED credits that are required and mandatory
"Bid Alt" Indicates LEED credit to be designed and priced as an Alternate Add

	Yes	Bid Alt				
Resp. Party	**18**	**6**	**SUSTAINABLE SITES**			**26**
GC	**Y**		Prereq 1	Construction Activity Pollution Prevention		Required
CIVIL	**1**		Credit 1	Site Selection		1
GAIA	**5**		Credit 2	Development Density and Community Connectivity {EB}		5
GC		**1**	Credit 3	Brownfield Redevelopment		1
GAIA	**6**		Credit 4.1	Alternative Transportation—Public Transportation Access (ID) {EB}		6
ARCH		**1**	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms (ID) {EB}		1
CIVIL	**3**		Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles (ID) {EB}		3
CIVIL/ARCH		**2**	Credit 4.4	Alternative Transportation—Parking Capacity (ID)		2
			~~Credit 5.1~~	~~Site Development—Protect or Restore Habitat 50% (75%) {EB}~~		1
LAND		**1**	Credit 5.2	Site Development—Maximize Open Space 25% (50%)		1
			~~Credit 6.1~~	~~Stormwater Design—Quantity Control {EB}~~		1
CIVIL	**1**		Credit 6.2	Stormwater Design—Quality Control		1
CIVIL	**1**		Credit 7.1	Heat Island Effect—Non-roof 50% (100%) {EB}		1
GC	**1**		Credit 7.2	Heat Island Effect—Roof Cool Roof 75% or Green Roof 50% (100%) {EB}		1
LIGHT		**1**	Credit 8	Light Pollution Reduction {EB}		1

	Yes	Bid Alt			
	5	**3**	**WATER EFFICIENCY**		**10**
MEP	**Y**		Prereq 1	Water Use Reduction 20% {EB}	Required
LAND	**2**	**2**	Credit 1	Water Efficient Landscaping 50%, 100% {EB}	2 to 4
			~~Credit 2~~	~~Innovative Wastewater Technologies 50% (100%)~~	2
MEP	**3**	**1**	Credit 3	Water Use Reduction 30%, 35%, 40% (45%) {EB}	2 to 4
	7	**9**	**ENERGY & ATMOSPHERE**		**35**
GAIA	**Y**		Prereq 1	Fundamental Commissioning of Building Energy Systems {EB}	Required
MEP/LIGHT	**Y**		Prereq 2	Minimum Energy Performance {EB}	Required
MEP	**Y**		Prereq 3	Fundamental Refrigerant Management {EB}	Required
MEP/LIGHT	**4**	**4**	Credit 1	Optimize Energy Performance 12% - 48% (50%) {EB}	1 to 19
MEP		**1**	Credit 2	On-Site Renewable Energy 1% - 13% (15%) {EB}	1 to 7
GAIA	**2**		Credit 3	Enhanced Commissioning {EB}	2
MEP		**2**	Credit 4	Enhanced Refrigerant Management {EB}	2
MEP	**1**		Credit 5	Measurement and Verification {EB}	3
OWNER		**2**	Credit 6	Green Power 35% (70%)	2
	7	**1**	**MATERIALS & RESOURCES**		**14**
ARCH	**Y**		Prereq 1	Storage and Collection of Recyclables	Required
ARCH	**1**	**1**	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
			~~Credit 1.2~~	~~Building Reuse - Maintain Interior Non-Structural Elements 50%~~	1
GC	**2**		Credit 2	Construction Waste Management 50%, 75% (95%)	1 to 2
			~~Credit 3~~	~~Materials Reuse~~	1 to 2
GC	**2**		Credit 4	Recycled Content 10%, 20% (30%)	1 to 2
GC	**2**		Credit 5	Regional Materials 10%, 20% (30%)	1 to 2
			~~Credit 6~~	~~Rapidly Renewable Materials 2.5% (5%)~~	1
			~~Credit 7~~	~~Certified Wood 50% (95%)~~	1
	9	**5**	**INDOOR ENVIRONMENTAL QUALITY**		**15**
MECH ENG	**Y**		Prereq 1	Minimum Indoor Air Quality Performance {EB}	Required
ARCH	**Y**		Prereq 2	Environmental Tobacco Smoke (ETS) Control {EB}	Required
MECH ENG		**1**	Credit 1	Outdoor Air Delivery Monitoring {EB}	1
MECH ENG		**1**	Credit 2	Increased Ventilation {EB}	1
GC	**1**		Credit 3.1	Construction IAQ Management Plan—During Construction	1
			~~Credit 3.2~~	~~Construction IAQ Management Plan—Before Occupancy~~	1
GC	**1**		Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
GC	**1**		Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
GC	**1**		Credit 4.3	Low-Emitting Materials—Flooring Systems	1
GC	**1**		Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
ARCH		**1**	Credit 5	Indoor Chemical and Pollutant Source Control {EB}	1
LIGHT	**1**		Credit 6.1	Controllability of Systems—Lighting {EB}	1
MEP	**1**		Credit 6.2	Controllability of Systems—Thermal Comfort {EB}	1
MECH ENG	**1**		Credit 7.1	Thermal Comfort—Design	1
GAIA		**1**	Credit 7.2	Thermal Comfort—Verification	1
GAIA		**1**	Credit 8.1	Daylight and Views—Daylight	1
GAIA	**1**		Credit 8.2	Daylight and Views—Views	1
	3	**3**	**INNOVATION IN DESIGN**		**6**
CIVIL	**1**		Credit 1.1	Exemplary Performance - SSc7.1 (100% parking under cover)	1
GAIA	**1**		Credit 1.2	Exemplary Performance - SSc4.1 (double transit ridership)	1
MEP/OWN		**1**	Credit 1.3	Exemplary Performance: WEc3 (40%) OR EAc6 (70%)	1
OWN/GAIA		**1**	Credit 1.4	Innovation: Green Cleaning Policy	1
OWN/GAIA		**1**	Credit 1.5	Innovation: Sustainable Purchasing Policy	1
GAIA	**1**		Credit 2	LEED Accredited Professional	1

2	**2**	**Regional Priority Credits**	**4**
1		Credit 1.1 Regional Priority: EAc2	1
1		Credit 1.2 Regional Priority: IEQc8.1	1
	1	Credit 1.3 Regional Priority: SSc5.2 OR WEc3	1
	1	Credit 1.4 Regional Priority: MRc1.1 OR WEc2	1

51	29	**Total**	**110**
Yes	Bid Alt	Certified: 40-49 Silver: 50-59 Gold: 60-79 Platinum: 80-110	

DIVISION 02

EXISTING CONDITIONS

SECTION 024116

STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes demolition and removal of the following:
   1. Buildings and structures.
   2. Site improvements including site utilities.
   3. Protecting existing trees in the public right of way adjacent to improvements to remain.
   4. Removing existing trees in the public right of way adjacent to improvements.
   5. Clearing and grubbing.
   6. Removing above- and below-grade site improvements.
   7. Disconnecting and capping or sealing site utilities.
   8. Temporary erosion and sedimentation control measures.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled.

1.3 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 SUBMITTALS (Not Applicable)

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI A10.6 and NFPA 241.

C. Predemolition Conference: Conduct conference at job site lay down area.

1.6 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of Work.

B. Owner assumes no responsibility for buildings and structures to be demolished.
   1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Hazardous Materials: It is expected that hazardous materials will be encountered in the Work.
   1. Hazardous materials will be removed by Owner before start of the Work.
   2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Hazardous Materials: Hazardous materials are present in buildings and structures to be demolished. Owner to be contacted if a report on the presence of hazardous materials is required for review and use.

E. Hazardous material remediation is specified elsewhere in the Contract Documents.

1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
2. Owner will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

H. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

I. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

J. Do not commence site-clearing operations until temporary erosion and sedimentation control measures are in place.

1.7 COORDINATION

A. Arrange demolition schedule so as not to interfere with Owner's on-site operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of building and site demolition required.

B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Inventory and record the condition of items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to Architect.

3.2 PREPARATION

A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
1. Arrange to shut off indicated utilities with utility companies.
2. If utility services are required to be removed, relocated, or abandoned, before proceeding with building demolition provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
3. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

B. Existing Utilities: Refer to Division 23 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping mechanical or electrical utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

D. Removed and Salvaged Items: Comply with the following:
1. Clean salvaged items of dirt and demolition debris.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in secure area until delivery to Owner.

4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

E. Protect and maintain benchmarks and survey control points from disturbance during construction.

F. Locate and clearly flag trees and vegetation to remain or to be relocated.

G. Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.4 TREE PROTECTION

A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

3.5 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during demolition and reinstalled in their original locations after demolition operations are complete.

C. Existing Utilities: Maintain utility services indicated to remain and protect them against damage during demolition operations.
   1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
   2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
      a. Provide at least 72-hours notice to Owner if shutdown of service is required during changeover.

D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 1 Section "Temporary Facilities and Controls."
   1. Protect existing site improvements, appurtenances, and landscaping to remain.
   2. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   3. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
   4. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.

3.6 DEMOLITION, GENERAL

A. General: Demolish indicated existing buildings, structures, and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Do not use cutting torches until work area is cleared of flammable materials. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

2. Maintain adequate ventilation when using cutting torches.
3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Engineering Surveys: Perform surveys as the Work progresses to detect hazards that may result from building demolition activities.

C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

3.7 MECHANICAL DEMOLITION

A. Remove buildings, structures, and site improvements intact when permitted by authorities having jurisdiction.

B. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on next lower level.

C. Remove debris from elevated portions by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
1. Remove structural framing members and lower to ground by method suitable to minimize ground impact or dust generation.

D. Concrete: Cut concrete full depth at junctures with construction indicated to remain.

E. Masonry: Cut masonry cleanly at junctures with construction indicated to remain.

F. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished at junctures with construction indicated to remain, then break up and remove.

G. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

H. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

3.8 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
1. Arrange with utility companies to shut off indicated utilities.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

3.9 CLEARING AND GRUBBING

A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

B. Place fill material in horizontal layers not exceeding a loose depth of eight inches, and compact each layer to a density equal to adjacent original ground.

3.10 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.11 EXPLOSIVE DEMOLITION

A. Explosives: Use of explosives is not permitted.

3.12 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Division 31 Section "Earthwork."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.13 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.14 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.15 REPAIRS

A. General: Promptly repair damage to adjacent construction caused by building demolition operations.

B. Where repairs to existing surfaces are required, patch to restore surface to original or better condition.

C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.16 RECYCLING DEMOLISHED MATERIALS

A. General: Separate recyclable demolished materials from other demolished materials to the maximum extent possible. Separate recyclable materials by type.
   1. Provide containers or other storage method approved by Architect for controlling recyclable materials until they are removed from Project site.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
   4. Store components off the ground and protect from the weather.
   5. Transport recyclable materials off Owner's property and legally dispose of them.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling building demolition materials shall accrue to Owner.

3.17 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.18 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION

SECTION 024119

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Removal of designated building equipment, materials and fixtures.
2. Removal of existing construction to accommodate new construction.
3. Disconnecting and capping removal of identified utilities.
4. Installation of temporary partitions to allow continued building occupancy by Owner.
5. Salvage of indicated items.
6. Removal of paving and plant material on site.

B. Related Sections:
1. Section 013100 - Project Meetings.
2. Section 014500 - Quality Control.
3. Section 015000 - Temporary Facilities and Controls: Temporary partitions and barriers.
4. Section 017329 - Cutting and Patching.
5. Section 017400 – Cleaning and Waste Management.

C. This Project is a registered US Green Building Council “LEED” project.
1. Reuse as much demolished materials as possible.
2. Direct recyclable materials to recyclers and divert as much demolished materials from waste stream and landfill as possible.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Schedules:
1. Submit schedule showing time and detailed sequence of demolition, removal of materials, arranged coordination for shut-off, capping, and continuation of utility services.

C. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
2. Qualification Data: Submit demolition contractor's qualifications.
3. LEED waste management reports.

D. Closeout Submittals:
1. Project Record Documents:
   a. Submit under provisions of Section 017800.
   b. Record actual locations of capped utilities.

1.3 QUALITY ASSURANCE

A. Contractor Qualifications: Company specializing in demolition work with minimum of 3 years documented experience.

B. Regulatory Requirements:
1. Comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, state and federal authorities having jurisdiction.
2. Obtain and pay for necessary permits and notices; post where required.
3. Comply with safety requirements of local fire department.

C. Certifications: Submit manufacturer's certification that rodent and insect control materials and instructions for their application comply with US Environmental Protection Agency requirements.

D. Notify affected utility companies before starting work and comply with their requirements.

E. Do not close or obstruct egress width of fire exits or access.

F. Do not disable or disrupt building fire or life safety systems without 72 hours prior written notice to Owner.

G. LEED Requirements:
1. Credit MR 2: Divert 50 percent of construction material waste and site clearing debris from disposal in landfill or incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.
2. Credit MR 2: Divert 75 percent of construction material waste and site clearing debris from disposal in landfill or incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.
3. Refer to Section 017400 Cleaning and Waste Management for additional requirements.

1.4 PRE-DEMOLITION CONFERENCE

A. Conduct conference in accordance with Section 013100 to discuss following:
1. Present draft of demolition schedule for review.
2. Coordinate phasing requirements.
3. Identify items to be protected and preserved before proceeding with work.
4. Conduct walking inspection to identify materials and equipment to be salvaged for re-installation and Owner use.
5. During walking inspection, photograph or otherwise determine and record existing physical conditions of boundary areas. Surfaces, equipment, or other items damaged during demolition work are to be restored to original condition as recorded during walking inspection.
6. Agree upon location where items salvaged for Owner are to be delivered and stored.
7. Obtain agreement from Owner on day-to-day scheduling requirements and restrictions to avoid disruption of Owner operations resulting from demolition work, dirt, or noise.
8. Discuss environmental requirements and procedures.
a. Solid Waste Management Plan.
b. IAQ Management Plan.
c. Procedures for noise and acoustics management.
d. Environmental Management Plan.
e. Environmental Regulatory Requirements.

1.5 PROJECT CONDITIONS

A. Occupancy:
1. Owner will vacate demolition area prior to start of demolition work.
2. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations.
3. Provide minimum of 72 hours advanced notice to Owner of demolition activities which will severely impact Owner's normal operations.
4. Maintain free and safe passage to and from Owner occupied areas.

B. Existing Conditions:
1. Owner assumes no responsibility for actual condition of areas to be demolished.
2. Variations within demolition areas may occur because of Owner's salvage operations.

C. Hazardous Materials:
1. Inform Architect and Owner immediately upon discovery of asbestos products, radioactive materials, radon gas, toxic wastes, or other similar hazardous materials.
2. Strictly follow procedures and regulations applicable to hazardous materials.
3. Do not remove hazardous materials without Owner authorization.
4. Give special consideration to handling of material that may contain asbestos. Neither asbestos detection or removal is part of this Contract, and direction relating to that type of work will be given by the Owner.
5. Architect will have no responsibility for detection, evaluation, or removal of asbestos materials, or for construction contract administration of removal process.

D. Explosives: Not permitted.

E. Traffic and Passageways:
1. Maintain accessibility for fire fighting apparatus.
2. Conduct demolition operations and debris removal to avoid interference with use of roads, streets, walks, and adjacent occupied facilities.

3. Obtain written permission from authorities having jurisdiction prior to closing or obstructing streets, walks, or other adjacent occupied facilities.
4. Provide alternate routes when closing or obstructing traffic ways when required by governing authorities.
5. Ensure safe passage of persons around area of demolition. Provide and maintain temporary covered passageways; comply with requirements of governing authorities.

F. Protection:
1. Perform Work in manner to eliminate hazards to persons or property and avoid interference with adjacent areas, utilities and structures.
2. Provide and maintain temporary barricades, fences, warning signs, guardrails, warning lights, weatherproof and dust partitions, and other similar provisions as necessary or required by applicable regulatory authorities for protection of building occupants and workers.
3. Provide and maintain fire extinguishers; comply with requirements of governing authorities.
4. Maintain existing utilities which are to remain in service and protect from damage during demolition operations.
5. Do not interrupt existing utilities serving occupied facilities, except when authorized by Owner in writing. Provide temporary services during interruptions to existing utilities.
6. Coordinate in advance with Owner mechanical, electrical, and plumbing shutdowns.
7. Protect existing work indicated to remain from damage.
8. Protect existing floors with suitable coverings when necessary.
9. Construct temporary dustproof partitions and seal return air plenums where necessary to areas where noisy or dirt and dust operations are being performed.
10. Provide temporary weather protection for areas where existing exterior elements were removed to ensure no water leakage or damage occurs to structure or interior areas of existing building.

1.6 SEQUENCING

A. Sequence work under the provisions of Section 011000.

1.7 SCHEDULING

A. Schedule work to conform to the approved construction progress schedule specified in Section 013300.

B. Schedule work to coincide with new construction.

C. Describe demolition removal procedures and schedule.

D. Perform work between the hours of 7 AM and 5 PM.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify demolition areas are unoccupied.

3.2 PREPARATION

A. Provide, erect, and maintain temporary barriers and security devices.

B. Protect existing structures, landscaping materials, and appurtenances which are not being demolished.

C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as necessary and be responsible for safety and support of structure. Assume liability for such movement, settlement, damage, or injury.

D. Cover and protect furniture, equipment, and fixtures scheduled to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

E. Utilities:
   1. Mark and identify location of utilities to be disconnected.
   2. Notify affected utility company in advance of date and time when service needs to be disconnected.
   3. Disconnect and cap utility services; comply with requirements of governing authorities.
   4. Do not commence demolition operations until associated disconnections have been completed.

3.3 DEMOLITION

A. General:
   1. Cease demolition operations immediately if adjacent structures appear to be in danger. Conduct safety operations as necessary. Do not resume demolition operations until directed.
   2. Conduct operations with minimum interference to public or private accesses. Maintain egress and access at all times.
   3. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.
   4. Sprinkle debris with water to minimize dust. Provide hoses and water connections as necessary.
   5. Do not cause flooding or contaminated runoff.

B. Demolish existing construction as indicated in orderly and careful manner to accommodate new work. Protect supporting structural members. Remove demolished materials from site daily and legally dispose of such materials. Recycle removed materials to greatest extent possible; Refer to Section 017400.

C. Perform demolition in accordance with governing authorities.

D. Remove and immediately dispose of contaminated or vermin infested materials when encountered.

E. Report to Architect and Owner unanticipated mechanical, electrical, or structural elements which conflict with intended function or design when encountered. Submit report in writing. Rearrange demolition schedule as necessary to continue overall project progress without delay.

F. Do not burn or bury materials or debris on site. Leave structures and site in clean condition.

3.4 ADJUSTING

A. Repair demolition performed in excess of that required.

B. Return structures and surfaces to remain to conditions existing prior to commencement of selective demolition Work.

3.5 CLEANING

A. General: Refer to Section 017400.

B. Broom clean demolition areas of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

C. Remove temporary work and protection when no longer needed.

END OF SECTION

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PROJECT NO.:	13.859.235
PROJECT TITLE:	710 Wilshire Blvd., Santa Monica Professional Building
CLIENT:	Alex J. Gorby, President, Maxser & Co Ltd
CONTACT:	Howard Laks, AIA, Howard Laks Architects, Inc.
	1545 Twelfth Street
	Santa Monica, CA 90401
	tel: 310.393.4455
	howard@hlaarch.com
SUBJECT:	Landmark features and elements investigation
BY:	John Griswold
DATE:	12/10/14

This report presents findings of on-site and lab investigations of the historical landmark features listed on the project documents by Howard Laks Architects, Inc., and addressed in the Historic Resource Assessment prepared by Chattel Architecture, Planning and Preservation, Inc., dated January 5, 2010. Characterization of original materials and coatings/ surface treatments of each feature and element, general condition, and recommended treatment are presented in a matrix format. The report also includes the results of a field investigation of moisture retention patterns detected on exterior walls and relief elements using infrared thermography and a moisture meter, as well as an investigation into the materials of the marble floor in the lobby and estimated feasibility of removal/replacement of local areas of marble tile.

Focus of the Investigation

Description:

This report presents results of an investigation of historic materials present on the exterior and interior of the historic Santa Monica Professional Building at 710 Wilshire Blvd., Santa Monica, California. The six-story building, designed by architect Arthur E. Harvey was completed in 1928. Items addressed include the Landmark Materials (#1 through #11) identified on drawing numbers A-301 M, A-303 M, and A-309 M by Howard Laks Architects, Inc., excluding the roof tiles (#2). Also addressed are selected historic elements in the main lobby.

The following services were performed:

- Review of archival documentation relevant to the identification and history of maintenance, modification, and restoration of the selected Landmark Materials. Documentation to be provided by the project team.

- Review of the Outline Specification for Facade Work drafted by Chattel, Inc.

- On-site condition survey of the Landmark Materials, with focus on characterization of representative examples of each item type, or specific artifacts called out on the drawings.

- Local coating removal in small, inconspicuous areas to identify coating stratigraphy and to characterize the substrate. Fine hand tools such as surgical scalpels will be used to expose the layers (”cratering”).

- Collection of small samples of the coating layers, at the discretion of the conservator, for microscopic examination. Some samples may be prepared as polished cross sections.

- Collection of corrosion products on metal surfaces, at the discretion of the conservator, to determine the presence of active chloride corrosion (e.g. “bronze disease”), in order to help develop recommendations for appropriate treatment.

- A written report incorporating the condition survey matrix, digital photographic documentation of representative items and detailing aspects of the investigation, procedures and results of field and lab examination of samples, and recommendations for treatment of each item type in the Landmark Materials list.

- Consultation with project team members, including Chattel, Inc. and Howard Laks Architects (HLA). John Griswold, Principal, will be available to attend public hearings as required.

Landmark Materials List

The following features and elements are numbered on the HLA drawings and listed as Landmark Materials:

1. Finials, cast stone concrete
2. (Roof, terra cotta mission tile, excluded)
3. Beltway, waste mold concrete in deep Churrigueresque relief, with some cast stone concrete elements possibly incorporated
4. Typical window frames of brake steel
5. Exterior walls, waste mold concrete with deep- and wide-jointed, ashlar motif
6. Parapet coping, terra cotta mission tile
7. Storefront windows, wood, steel, aluminum brake metal
8. Wilshire entry, waste mold concrete and cast stone concrete
9. (Wilshire entry door, aluminum brake metal, excluded)
10. Heraldic shield, waste mold concrete
11. Masonry grill, waste mold concrete

Investigation of Original Finishes

The results of the investigation of original finishes are presented in a matrix in the appendix of this report. A brief summary of the apparent original appearance of the building is included below. A much more detailed and exhaustive investigation, including sophisticated laboratory analysis and larger scale removal of overlying coatings on this building, as well as other, closely related buildings from this period by the same architect, would be needed to confirm the initial impressions resulting from this study.

This study indicates that a subtle, sophisticated aesthetic treatment may have enhanced the Spanish Colonial Revival style decorative detailing. The Plateresque and Churrigueresque relief decoration was given a very early, if not original, transparent glaze of varnish or oil, over a thin, cream or white colored finish render of fine sand with a white cement matrix. This coating may have been applied for practical reasons to seal the porous molded concrete, but it may also have served as a preparation for selective application of a pale green paint accent. A similar sanded white render was detected in samples taken from the faux ashlar walls, but apparently without the resin/oil or green accent. The ashlar effect was likely enhanced by subtle modulation of texture and/or applied tint, to differentiate the individual block units simulated by the deep jointing imparted in the concrete in the waste mold. Certain features, such as the rich, cast stone surround

at the main entry, would have exhibited a fine, integral, sandstone-like texture, examples of the highly developed art of “cast stone” ornamentation.

Such an interpretation of the overall scheme of the decorated masonry facades may be too facile, as exploratory cratering of the coating layers revealed the presence of a green resin/oil glaze on the ashlar walls at the second floor roof garden, somewhat similar to that seen on samples taken from the beltway and roof parapet. Nonetheless, a cursory comparison of archival photographs of the Santa Monica Professional Building with those of other close examples by the architect reveal a consistent attention to aesthetic subtlety of surface finish. Great effort was clearly taken to mimic dimensional stone block construction while taking full advantage of modern ferro-concrete engineering. (See captioned reference photographs in the appendix.)

The multi-pane casement windows originally featured a black, chemical patina, as did the twisted iron bars and cast fittings flanking the display windows. The woodwork associated with these windows were painted black.

The table in the appendix presents a matrix of information regarding these specific features and elements, including past observations, current field observations, and the results of sampling and microscopic study of coating materials. Recommendations for treatment are included.

Moisture Assessment Survey

A moisture assessment was focused primarily on the exterior walls to determine whether the elastomeric coating applied as part of the overall earthquake repairs was forcing the accumulation of interior water. This is of concern as trapped moisture activates corrosion of internal steel reinforcements, and the destructive action of accumulated soluble salts within cracks and pores of the masonry.

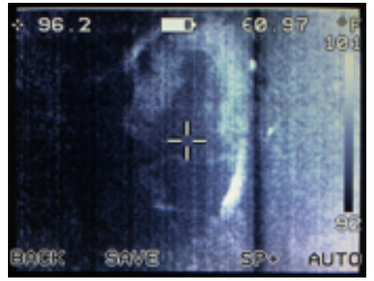
A Protimeter Surveymaster moisture meter and an Irisys IRI 4010 Multi-Purpose thermal Imager was used to detect trends in moisture retention on the exterior features and elements of the building. This information is helpful in estimating the extent and likely locations of moisture-related deterioration issues not readily apparent.

Thermal images below are paired with images of the same location, taken at the same time, in natural light. The gray scale gradient bar at the right in the thermal images shows the corresponding range of surface temperatures related to the infrared emission detected at that area of the image. Lighter tone areas represent higher emission of infrared energy.

In porous masonry substrates, the presence of sub-surface moisture produces a range of tonal anomalies in the infrared image, under certain conditions. When heat is introduced into an area of masonry, for example when sunlight warms a building facade, evaporation processes of the trapped moisture is increased. This increased activity often translates into image areas that are lighter in tone, as infrared emissivity is increased at the evaporation face. Darker areas are often seen adjacent to the evaporation zones, indicating a relatively low infrared emissivity caused by the reservoir of retained moisture within the substrate.

Interpreting such images requires training and experience. Different materials reflect and absorb infrared energy differently. In many images, the tonal value ranges correspond closely to the corresponding image in natural light, complicating the interpretation of moisture activity. Infrared thermography is an examination technique that is most useful when used with other means of detecting moisture. A moisture meter can corroborate the presence of moisture in localized areas by producing numerical readings at each point of contact measurement. These data, when plotted, can show trends of higher or lower moisture content within a single porous masonry material type (such as brick, concrete, or stone). The numerical readings are not quantitative measurements of the moisture present within. When the thermal image and the moisture meter data support each other, a strong indication of sub-surface moisture accumulation is present. By spot checking areas that are accessible at close range with a moisture meter, a level of confidence is established when interpreting thermal images of entire facades.

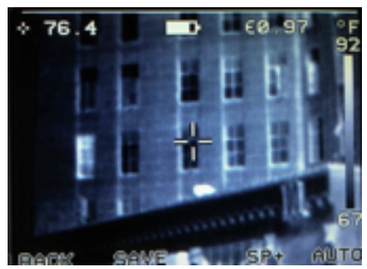
The thermal image survey at 710 Wilshire confirmed that where sub-surface moisture is present, it is being retained within the concrete masonry by the elastomeric coating. Thermal images were taken at several areas where the coating was failing. Several square inches of poorly adhered elastomeric coating were removed by hand. Thermal imaging of these areas showed an immediate increase

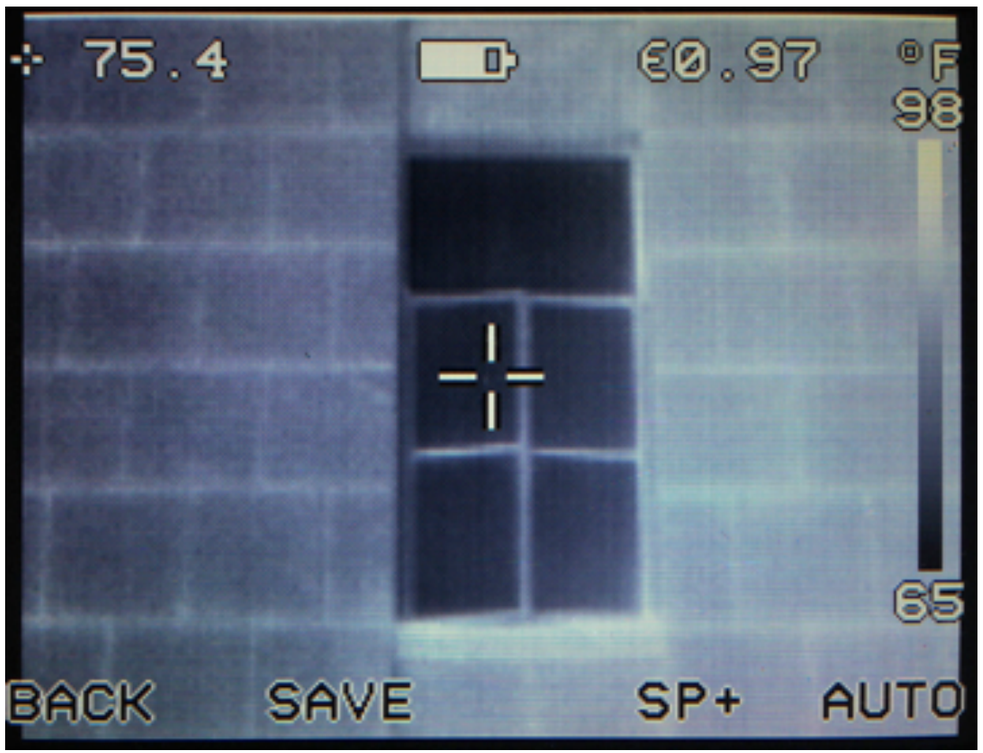


in evaporative activity at these areas. Moisture meter readings taken during and after the removal of the coating confirm that sub-surface moisture is higher in the areas of concrete still covered by the coating, while the moisture at the surface of the exposed face diminished significantly. It should be noted that the concrete was in good condition where the coatings were removed, and only slight amounts of salt efflorescence were present.

An area of the sidewalk at the west elevation along 7th Street is cracked and patched, with an iron pipe exposed. Here, prominent moisture retention and evaporation activity was seen. This activity does not seem to represent a significant moisture issue for the masonry. It does demonstrate, however, that the thermal images do detect and show moisture patterns in a dramatic fashion when present.

Where the elastomeric coating is intact and well-adhered, as is apparently the case on most of the surface of each elevation, the moisture readings tend to be lower. The thermal images showing broad areas of the facade show few localized anomalies of dark or light tone. The wide, deeply recessed “joints” of the imitation ashlar masonry, cast in the waste mold, tend to show as lighter in tone, suggesting that slow evaporation does occur at these areas of increased surface area and lesser thickness within the ashlar bond pattern. Similar areas of relatively higher evaporation rates are seen at window openings, and at edges of relief decoration.

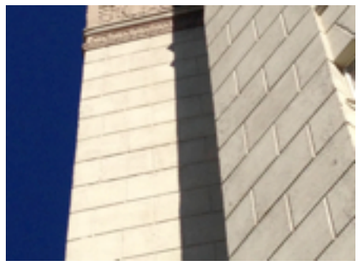


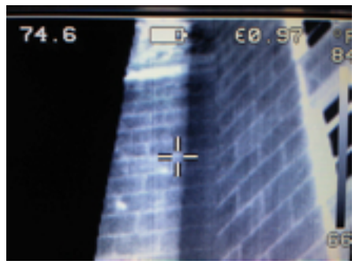


Nonetheless, the pattern that appears in the infrared images of the walls is one of general consistency, without significant indication of localized trapped moisture.

Rising damp, or trends of moisture infiltration from rooflines or parapets, were not detected. This would of course change in rainy conditions - the survey was performed in late summer and early fall months with no rainfall. Nonetheless, if these trends of general moisture intrusion were a major pattern at this building, and substrate deterioration related to gradients of destructive salt accumulation had been caused by this over the years, some signs would most likely be detected in the thermal images and moisture readings. A modest gradient of moisture change from the ground line up the wall at the south elevation quickly dropped off at about 4-6 feet.

Structural cracks at the northwest corner of the building, around the second to fourth floors, exhibited tonal anomalies in the infrared images, indicating the active presence of sub-surface moisture. As the cracks represent areas of ready moisture





intrusion from the exterior, it is to be expected that moisture would accumulate here simply from condensation at night and early morning, to be released again as the facade warms in the sun. In periods of rain, run-off down the wall face and driving rain would force water inside here as well, but it may evaporate readily when the wall surfaces are warmed and relative humidity falls. There is no obvious sign that such moisture travels and accumulates internally, to emerge elsewhere to cause damage at the surface. There is some paint coating failure (cracking, curling flakes, loss) associated with these areas, but this seems limited to the immediate area of the structural cracks.

Infrared images of the cast relief at the beltway exhibit markedly different thermal activity in comparison with the faux ashlar walls. This was most apparent where the south elevation had been warmed evenly for hours by the sun. As seen in the image below, the bright rectangles at the top corners correspond to what are likely

separately-cast decorative panels, affixed to the building. Within the panels, evaporative activity is evenly distributed, concentrating at projecting and/or thinner areas of the relief. Some internal seams or joints may also be revealed, artifacts of the casting and assembly processes. In general, the surfaces of the relief decorations appear to be sound.

These observations are preliminary. The nature and extent of actual conditions cannot be properly understood without full removal of all coatings, repairs, etc. However, the results of the survey suggest that the elastomeric texture coating and subsequent paint coatings are reasonably intact, and that the concrete substrate is in good overall condition (any structural issues aside).

Moisture Study Recommendations

Full removal of the elastomeric texture coating is likely to reveal many patched cracks and other repairs made after the Northridge earthquake, according to discussions with the project team. The present coating, while it obscures some detail, imparts a texture not original to the building, and retards the escape of sub-surface moisture, appears not to be harming the historic fabric. It does not appear to be trapping excess moisture or forcing the sub-florescence of destructive soluble salts. As much of the coating remains intact, it may be reasonable to leave most of it in place on the main faux ashlar walls, and to perform removal only where local coating failure is visible. Medium pressure washing is expected to loosen compromised areas in need of re-coating, leaving sound areas of the coating intact. (The areas of visible coating failure are mainly associated with structural cracks in need of repair, so local coating removal is required here in any case.)

Full removal of coatings on the relief decorations might be warranted. Paint layers, including a textured elastomeric material, obscure fine detail on all relief decorations. Some of these, like the entry surround, may never have been intended to be coated, having a stone-like surface appearance inherent to the “art stone” material. The remainder of the cast concrete relief decorations were likely finish-coated with a fine, light, sanded stucco to even out surface voids and other flaws from the waste mold process (e.g. areas of large, exposed aggregate, etc.), but this coating seems to have been designed to closely simulate a stone-like or glazed ceramic appearance. (See notes in the matrix regarding possible presence of a transparent green glaze or accenting scumble.) Feasibility of removal of coatings on these features and elements should be demonstrated through testing (chemical strippers, pressure washing or possibly contained-abrasive blasting systems (e.g. Joss, Thomann Handry, etc.). Depending on conditions found after coating removal, a protocol for consolidation, stabilization, and visual integration of local damage or repairs may allow these significant decorative elements to be re-invigorated Such a protocol may include re-coating with a fine, sanded stucco similar to the original, and possibly even the artistic addition of a tinted, translucent or transparent color layer, if further evidence of such treatment is uncovered.

With the main walls remaining coated, and the relief decorations uncovered, moisture evaporation patterns may shift to the decorative elements and features. increased efflorescence may occur in these areas. Application of an appropriate penetrating sealer may help control this.

Entry Lobby Floor

The feasibility of the removal and salvage of the marble floor tiles in the entry hall/lobby on the ground floor was investigated. Several areas along the west wall exhibited local damage and loss, with some partial infilling with cement patching material. These presented an opportunity to investigate the nature and integrity of the setting bed, and to determine the thickness of the marble tiles and their adhesion to the setting bed.

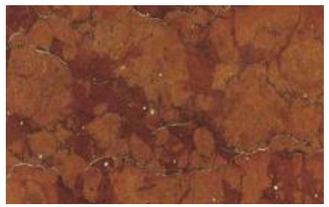
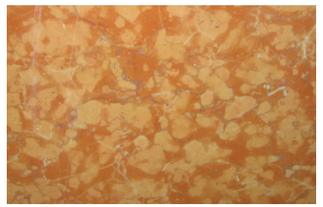
<u>Identification of Stone Types</u>

There are four main types of marble used in the floor. These include black with white and green veining, orange-red breccia-type, yellow breccia type, and cream-gray with fine pink and white veining.

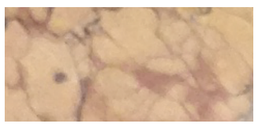
The red and yellow marbles are a breccia-type. Both of these marbles are used for the same pattern element: the 4” x 12” elongated, rectangular pieces flanking the large square central tiles. Red or yellow types occur without any obvious pattern (either by design or apparent repair or other modification after original placement).

Identification of the marble species was based only on visual comparison with published samples.

The red and yellow marbles appear to be closely related, and are quite likely both *rosso verona.* The range of reddish to yellowish hues seen in this type of Italian marble is significant.

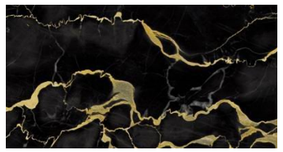
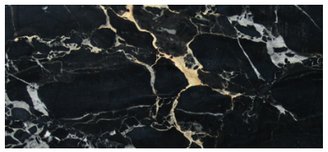
Two color variations of rosso verona *marble*

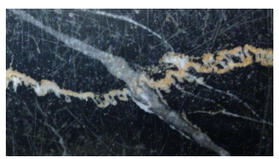
Details from 710 Wilshire floor (not to scale)

The black marble is used as border tiles, as well as for the small 4” squares forming the intersection of the red and yellow rectangular tiles.

The black marble resembles Italian *portoro* types:

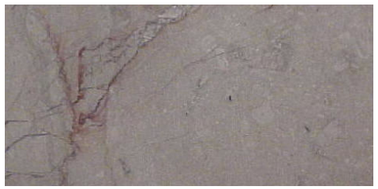



Several variations of portoro *type black marble from Italy*

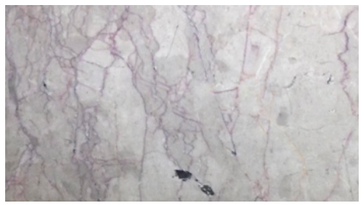


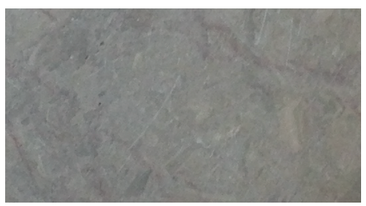
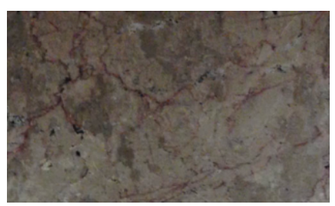

Details from 710 Wilshire floor (not to scale)

The cream-gray marble, with its fine pink veining, resembles St. Thomas lila marble. It is used for the 12” square field tiles.



St. Thomas lila marble examples



Details from 710 Wilshire floor (not to scale)

Removal Tests

Removal tests were performed with careful hand methods. An already-fragmented piece of black marble was selected for removal in pieces to reveal the tile floor construction. The marble is 1-inch thick, and laid into a hard cementitious setting bed, Portland cement-based. The joints between tiles are filled with a tan-colored, very fine grained, cementitious grout. Joints vary in width from hairline to 1/16-inch. Both the marble and setting bed were difficult to remove with hand tools. The marble is firmly set and well-bonded to the very hard bedding mortar.

The green arrow indicates the hard Portland cement setting bed, excavated beneath part of an overlying broken black marble tile.

Recommendations

The existing marble flooring at the first floor entry lobby is an integral part of the building's historic character and this original material should be retained and protected in place unless local removal is critical to the seismic retrofit of the building.

During construction, the flooring should be protected in place with plastic sheeting and hard protection boards to ensure no damage or abrasion from moisture, construction operations, dust and debris.

Prior to any repairs, the entire floor should be cleaned and stripped of any coatings. Minor repairs to marble tiles, such as filling small cracks or voids, can be made with a pigmented repair mortar. Cracked or eroded grout joints should be infilled with a comparable grout mix. Retain sound historic grout. Do not sawcut joints.

Replacement of heavily cracked or eroded tile should be made in localized areas using new stone of similar type, color, and finish. The tile to be replaced should be removed by careful hand methods so as to not damage adjacent tile. Salvage of existing whole tiles for reuse may be extremely difficult as they will most likely break during the removal process, as the bond to the hard cement bed is often stronger than the stone itself. However once one tile has been removed, it may be possible to loosen an adjacent unit from the setting bed. The existing setting bed, depending on condition, may remain in place, and a thinner replacement unit (3/4-inch thick) installed over it with new mortar. Grouting of new tile joints should be made using a comparable grout mix.

Eroded areas of the breccia marbles Cracks and eroded depressions of all the marble tiles should be thoroughly cleaned of embedded grime with methods that do not attack the calcareous stone (no acids, or alkaline products that may leave behind salts, etc.). Deeply eroded areas of loss should be degreased with an appropriate solvent and infilled with a compatible, thermosetting resin, colored to closely match the original color and translucency.

After all repairs have been completed, the entire floor may be re-honed to achieve an appropriate friction coefficient for public areas. and should be coated with an appropriate commercial penetrating sealer and finish product compatible with high-speed buffing machines.

Submitted by:

12/10/14

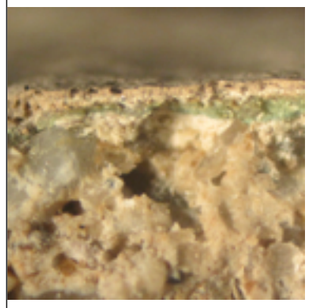
Griswold Conservation Associates, LLC

Date

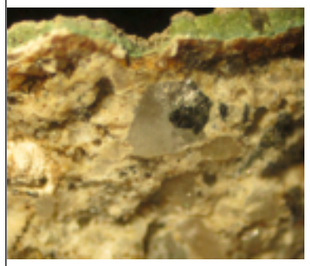
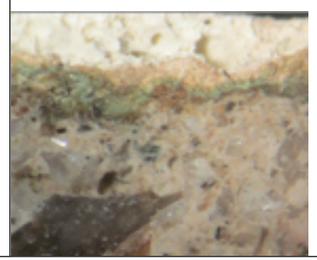
Appendix

Matrix of Findings and Recommendations

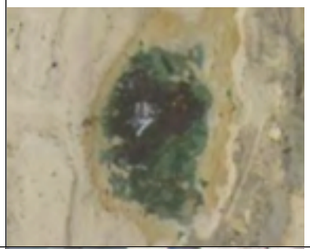
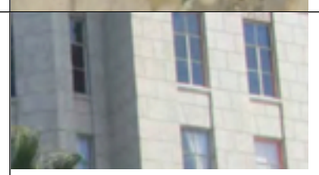
710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Finial in Spanish Renaissance Revival, Plateresque style	Cast stone concrete	Appears to have been painted soon after completion in a warm gray, verify paint color by paint analysis; has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint	  	The closest layer to the substrate appears to be the green resinous paint, without a brown layer below it. Fine, consistent, sandstone-like texture and color to casting.	Fine sandstone color and texture, likely originally intended appearance, not painted. Not as fine as the “art stone” appearance at main entry surround, etc. Fine texture and minimal porosity likely eliminated need for the oil/resin coating? Archival photos are ambiguous; seem to show very early painted appearance, but might appear extra light due to photo exposure. A detached finial, collected during earlier renovations, was never painted. It responded to detergent cleaning.	Option 1: Strip paint layers with a chemical stripper such as Peelaway line by Dumond Chemical, Inc. Treat stripped appearance with siloxane penetrating sealer such as MasonRE R-97 Water Repellent (Cathedral Stone Products, Inc.). ~~Apply pale green, translucent glaze paint.~~ ~~Option 2:~~ prep and paint ~~pale green~~ with breathable masonry paint system such as MasonRE sy sili **Replicate and install two types of finials. Core out ferrous metal anchors on existing finials. Reinstall using stainless steel anchors and epoxy. Repair using Jahn Cathedral Stone patching products. Provide mock-ups for review and approval. Paint color specified in JDRB COA.**

710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

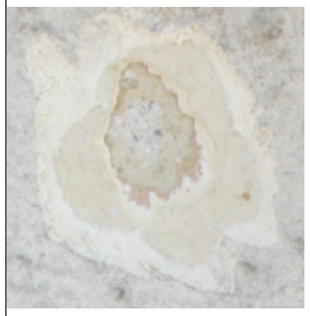
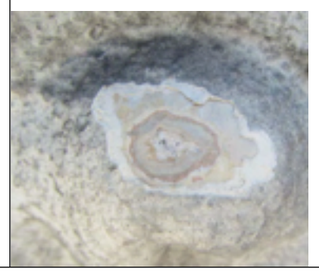
Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Finial in Spanish Renaissance Revival, Plateresque style	Molded concrete		 	Closest to substrate is a brown to green, oleo-resinous layer. The next layer looks like the green layer seen in the finial. Surface appears to be a dash coat or in-mold finish coat of white cement and white sand	The nature of the brown, resinous layer, possibly an original surface treatment, is not clear. It likely has darkened, possibly more clear originally. It does not occur on the cast stone finials. Perhaps it is a protective coating on the cast concrete, intended as the sole surface treatment, unpainted originally. Alternatively, it could be a sealing primer for the porous casting in preparation for an original pale green resin paint, matching the finials. F. Onderdonck mentions the use of linseed oil for preparation for application of polychromy on concrete.	Option 1: Strip paint layers with a chemical stripper such as Peelaway line by Dumond Chemical, Inc. Treat stripped appearance with siloxane penetrating sealer such as MasonRE R-97 Water Repellent (Cathedral Stone Products, Inc.). ~~Apply pale green, translucent glaze paint.~~ ~~Option 2:~~ prep and paint ~~pale green~~ with breathable masonry paint system such as MasonRE system (sili… siliconate). **Replicate and install two types of finials. Core out ferrous metal anchors on existing finials. Reinstall using stainless steel anchors and epoxy. Repair using Jahn Cathedral Stone patching products. Provide mock-ups for review and approval. Paint color specified in JDRB COA.**
Roof	Terra cotta Mission tile	Natural red color, not blended, recommend Gladding McBean Blended Red or equal, install with Newport Tool & Fastener Co. “Tyle-tye” strap system	Not addressed	Not addressed	n/a	n/a
Beltway, in Spanish Renaissance Revival, Plateresque style	Molded concrete with heavy relief decoration	Appears to have been painted soon after completion in a warm gray, verify paint color by paint analysis; has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint	 	Closest to substrate is a brown, oleo-resinous layer. The next layer looks like the green paint layer seen in the finial. Surface appears to be a dash coat or in-mold finish coat of white cement and white sand.	The nature of the brown, resinous layer, possibly an original surface treatment, is not clear. It likely has darkened, possibly more clear originally. It does not occur on the cast stone finials. Perhaps it is a protective coating on the cast concrete, intended as the sole surface treatment, unpainted originally. Alternatively, it could be a sealing primer for the porous casting in preparation for an early, if not original, pale green resin paint, matching the finials. F. Onderdonck mentions the use of linseed oil for preparation for application of polychromy on concrete.	~~Option 1: Strip paint layers with a chemical stripper such as Peelaway line by Dumond Chemical, Inc. Treat stripped appearance with siloxane penetrating sealer such as MasonRE R-97 Water Repellent (Cathedral Stone Products, Inc.). Apply pale green, translucent glaze paint.~~ ~~Option 2:~~ prep and paint ~~pale green~~ with breathable masonry paint system such as MasonRE system (silicate paint with added siliconate). **Paint colors specified in JDRB COA.**

710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Windows - multi-pane steel casement windows	Steel sash	Appears to have been painted originally in a medium forest green color, verify paint color by paint analysis; remove loose and flaking paint, likely remove completely at strike surfaces; if reglazing, consider laminated glass, typically 3/8 inch thickness and reglaze with putty, consider Low-e coating with little reflectivity (mirror quality), laminated glass may reduce or eliminate need for interior storm window, all windows should remain operable, but potentially be permanently closed	  	Compact black layer over bare, bright metal may be chemical patina, above which is a green paint layer. Later cream, pale gray, off white paints alternate.	The absence of an obvious priming layer in contact with the passivated metal surface suggests the metal was not intended to be painted originally. A clear coating such as an oil or lacquer, applied over the dark gray-black patina might have degraded early on, followed by direct application of color within 10-20 years.	~~Strip, re-patina with iron tannate-based system, clear coat?~~ ~~Additional comments from email discussion with Steven Hong of HLA: ...discussion with Robert Chattel about the treatment of the windows, to do them in place vs full removal and refurbishment, adding a double thickness/ insulated glass, etc. Basically any practical treatment to removal all paint to bare metal, passivate the corrosion, and establish a black chemical patina, followed by a durable protective coating would be acceptable. An alternative would be the application of a suitable paint system that simulates a blackened steel appearance, in case the maintenance for that is more practical for the client in the long ter~~ **Remove loose and flaking paint, repair each window frame and sash, as necessary, including removing LBP from all strike surfaces. Paint color specified in JDRB COA.**
General Exterior Walls (Ashlar motif)	Waste mold concrete with deeply jointed ashlar pattern cast in place	Appears to have been painted soon after completion in a warm gray, verify paint color by paint analysis; has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint	 	No green pigment found. Original layer may be as-cast concrete. Smooth texture observed at protected joint interiors.	Comparable surfaces on other contemporary buildings by the architect exhibit naturalistic variations to enhance separate unit ashlar construction, simulating stone. Possibly differently oiled, pigmented? Hard to trace without multi-location statistical approach. (Notable exception: Second floor, E elevation, much green predominance?): 	~~Prep, neutral base coat color in masonry paint, artistic subtle "wipe" layer (scumble) to simulate subtle variations mimicking~~ **Remove loose and flaking paint with the exception of the area below the podium parapet where all paint is to be removed using gentlest possible means, see paint removal treatment for finials. Paint color specified in JDRB COA.**

Griswold Conservation Associates, LLC

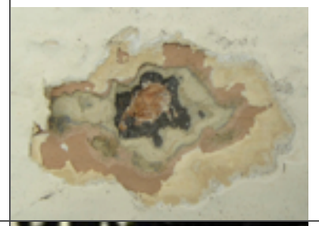
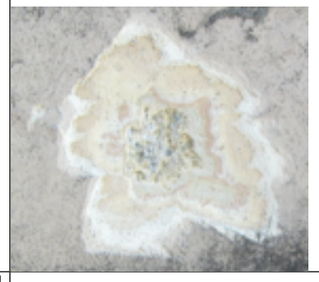
710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Podium band	Waste mold concrete	Appears to have been painted soon after completion in a warm gray, verify paint color by paint analysis; has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint	   	No green pigment found above or below arches, or on owl detail. Original surface appears smooth, with white matrix and sand.	Lowest register of facade elevation may have been dash coated with white stucco over the concrete. Relief termini may be separately cast “art stone” units. Coating stratigraphy is closely similar to the rest of the podium band, suggesting it was treated similarly.	Prepare existing for repainting. Replicate presumably-intended bright white, smooth surface with breathable mineral paint system such as MasonRE paints (Cathedral Stone Products, Inc.) **Remove paint using gentlest possible means, see paint removal treatment for finials. North entrance door to be natural finish, unpainted. Paint color specified in JDRB COA.**

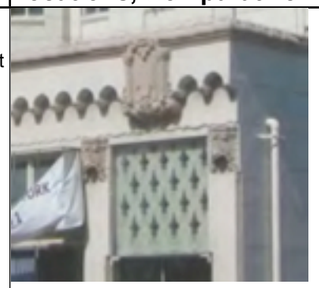
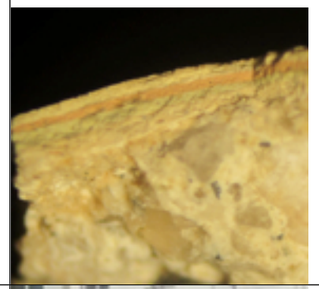
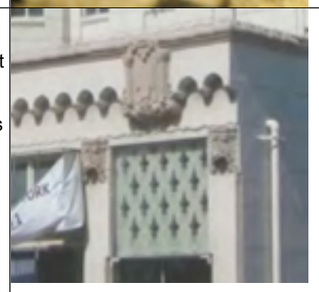
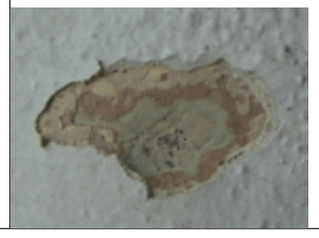
710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Column/column cap/fixture	Waste mold concrete	Appears to have been painted soon after completion in a warm gray, verify paint color by paint analysis; has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint	  Paint removal test:  	No green pigment found. Original layer may be bare cast stone.	The decorative elements of the doorway all appear to have been pre-cast, artstone-type units, with a varied colored sand in a warmer matrix. These might be fully recovered with careful effort. Additional stripping tests were performed in situ with a range of commercial paint stripping gels. Multiple layers were very tenacious. Controlled water blasting may be required as part of the process. Some cementitious patches from old repair were seen.	Remove all coatings. Local fine repairs as needed ~~under direction of conservator~~. Apply penetrating siloxane sealant such as as MasonRE R-97 Water Repellent (Cathedral Stone Products, Inc.). **Remove paint using gentlest possible means, see paint removal treatment for finials. North entrance doorway to be natural finish, unpainted. Paint color specified in JDRB COA.**

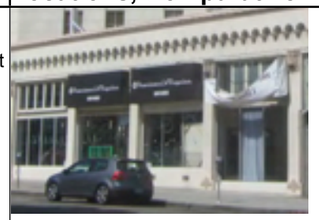
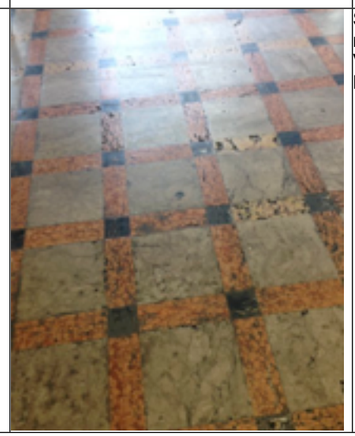
710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Storefront windows	Wood sash at storefront and transoms, majority lower storefront area altered with added contemporary aluminum brake metal within wood frame	Storefront windows appear to have wood perimeter trim and added contemporary brake metal, wood appears to have been originally painted black, verify paint color by paint analysis; consider retaining existing wood trim and replacing all storefront brake metal in lower portion, retain all existing wood transoms, make operable as originally intended, but potentially be permanently closed, use contemporary black anodized storefront brake metal with small profiles, wide stiles and rails on doors	 	There is a cream-colored pigment closest to wood, but historic photos show dark window frames that more closely resemble the black layer directly above it.	Likely that the cream colored layer is a primer for the black. This would echo the black patina of the steel window frames, and also the black treated surface of the wrought iron twisted vertical bars.	Prepare for repainting, including addressing damaged, missing or deteriorated substrate. Abatron system (Liquid Wood and WoodEpox) may follow Boracare treatment as needed for rot, etc. Gloss to be determined but a semi-gloss is possible “aesthetic target”. **Remove loose and flaking paint. Make transom windows operable including removing LBP on strike surfaces. Screw operable windows in closed position. Paint color specified in JDRB COA.**
Wilshire entry	Waste mold concrete	Appears to have been painted soon after completion in a warm gray, verify paint color by paint analysis; has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint	 	No green pigment found. Original layer may be bare cast stone.	The decorative elements of the doorway appear to have been pre-cast, artstone-type units, with a varied colored sand in a warmer matrix. These might be fully recovered with careful effort. See related entry for information on paint removal testing.	Remove all coatings. Local fine repairs as needed under direction of conservator. Apply penetrating siloxane sealant such as as MasonRE R-97 Water Repellent (Cathedral Stone Products, Inc.).
Wilshire entry door	Altered with contemporary aluminum	Replace existing with either wood frame door and transom or appropriate contemporary aluminum, painted or black anodized as at storefronts, contemporary black anodized storefront brake metal with small profiles, wide stiles and rails on doors		not addressed	n/a	n/a **Replace existing door and transom with historically appropriate replica of original as shown in original drawings and photographs. Likely natural wood finish with clear coat.**

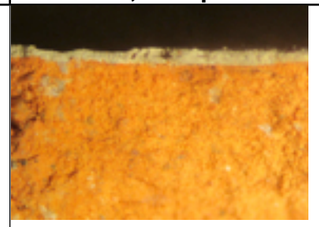
710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Heraldic shield on west elevation	Waste mold concrete	Has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint	 	No green pigment found. Original layer may be bare cast concrete, fine texture.	The microscopic cross section shows possible white finish coat integral to casting process - white cement matrix and white sand. Artstone-like surface may be recoverable.	Remove all coatings. Local fine repairs as needed under direction of conservator. Apply penetrating siloxane sealant such as as MasonRE R-97 Water Repellent (Cathedral Stone Products, Inc.). **Remove paint using gentlest possible means, see paint removal treatment for finials. Paint color specified in JDRB COA.**
Masonry grill	Concrete	Has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint; twisted rope edging around grill is missing and should be replaced	 	No green pigment found. Original layer may be bare cast concrete, fine texture.	The microscopic cross section shows possible white finish coat integral to casting process - white cement matrix and white sand. Artstone-like surface may be recoverable.	Replace twisted rope edging. Remove all coatings. Local fine repairs as needed under direction of conservator. Apply penetrating siloxane sealant such as as MasonRE R-97 Water Repellent (Cathedral Stone Products, Inc.). **Remove paint using gentlest possible means, see paint removal treatment for finials. Paint color specified in JDRB COA.**

710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Ground level wall finish – south and east elevations	Concrete shear wall/waste mold concrete with scored ashlar pattern	Has been painted with several layers of coatings, consider complete removal of coatings, but likely reapply new paint coating, spec breathable masonry paint	 	No green pigment found.	Lowest register of facade elevation may have been coated with white stucco over the concrete. See also podium band notes above. A similar relationship may be seen in historic photos of the American Storage Company Tower (1928-29), where upper cast concrete appears to simulate ashlar masonry, with tonal variations between simulated blocks, while the lower part of the facade is a uniform white tone. See appendix.	Prepare existing for repainting. Replicate presumably-intended bright white, smooth surface with breathable mineral paint system such as MasonRE paints (Cathedral Stone Products, Inc.) **Remove paint using gentlest possible means, see paint removal treatment for finials. Paint color specified in JDRB COA.**
Fire escape	N/A	Remove ladder and infill floor to match adjacent; color to be determined		not addressed	n/a	**Remove loose and flaking paint. Paint color specified in JDRB COA.**
Lobby/Entry Hall marble floor	Marble	None (not included on Landmark Materials list as it is an interior feature)		See GCA report. Likely Italian marble species used: Rosso Verona, Portoro, St. Thomas Lila	Report addresses feasibility of partial removal and salvage of tiles for re-use, as needed to accommodate seismic retrofit and other design alterations. Bond to hard cement setting bed is tenacious, tiles likely to break (over 50-60% breakage is expected). Replacement with available matching stone species of severely damaged tiles is recommended.	General cleaning, strip floor coatings and grime, degrease eroded losses (esp. in Rosso Verona) and fill with appropriate colored epoxy or polyester fill, re-hone for appropriate friction coefficient for safety, penetrating sealer and removable commercial f **Protect and retain in situ or in place existing marble floor above basement lid. Remove and salvage all other marble floor, provide exact match for marble and reinstall salvaged and new material north and south of existing retained marble floor.**

710 Wilshire Blvd
Landmark Features and Elements Investigation Matrix

Element	Material	Previous Notes	Images: Sampling, Locations, Comparative Info	Observations	Discussion	Treatment
Parapet tile coping	Terra cotta Mission tile	Natural red color, not blended, recommend Gladding McBean Blended Red or equal, consider salvage and reinstallation of existing tile, including removing overpaint (not intended to have been painted)		Cross section shows fire-skin may remain intact under paint layer.	-	Salvage and reinstallation of existing; remove overpaint but preserve fire-skin of fired ceramic **Reinstall salvaged tile with overpaint removed to the extent feasible and new material that exactly matches existing.**

Reference Photographs

Santa Monica Professional Building at 710 Wilshire Blvd., likely prior to 1930, shortly after completion; the automobiles look earlier, also the General Electric sign was not yet installed. Note also the plants on the second floor roof garden are less mature. Compare the two potted cypresses flanking the second floor window at left, with the same trees seen in a photo with the General Electric sign in place, dated circa 1930 (see below).

Circa 1930, Courtesy of Los Angeles Public Library Photo Collection

http://photos.lapl.org/carlweb/jsp/photosearch_pageADV.jsp

Detail. The parapet, as well as the faux ashlar walls, exhibit tonal variations of individual "blocks". A finish coat of white stucco matrix with fine sand may be the first layer in contact with the cast concrete. This may have been subtly tinted or textured for aesthetic effect to enhance the illusion of natural stone.

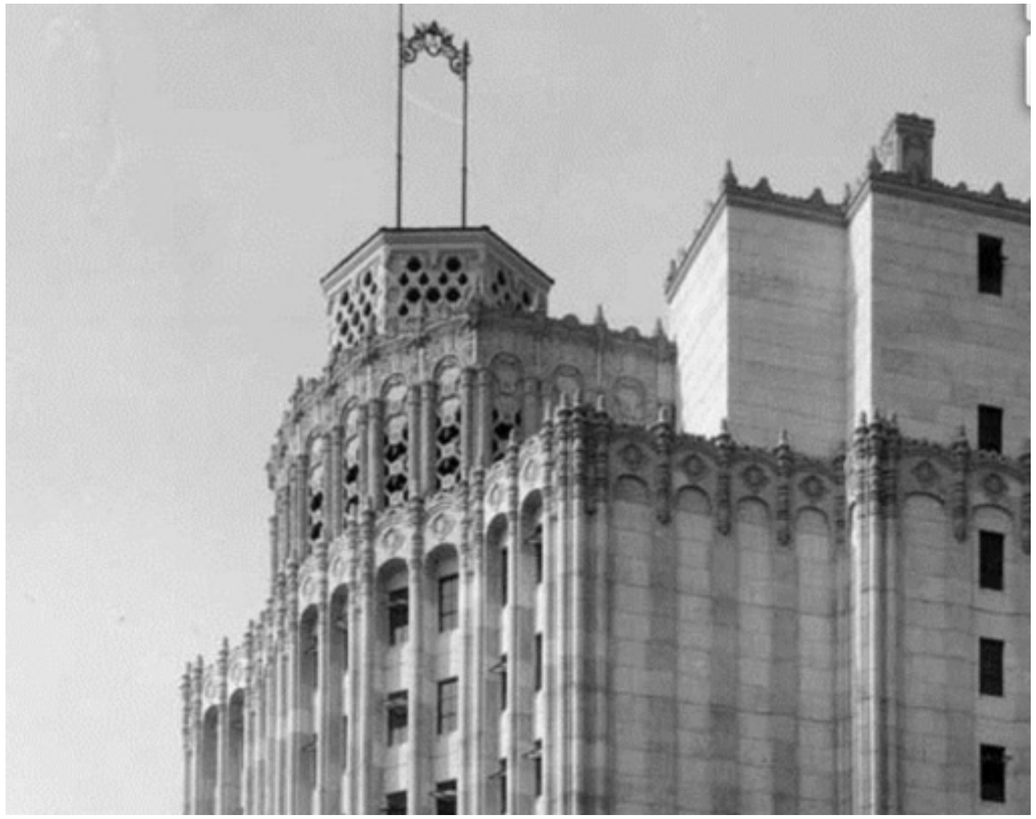
Santa Monica Professional Building, 710 Wilshire Blvd. Circa 1930?, Courtesy of Los Angeles Public Library Photo Collection
http://photos.lapl.org/carlweb/jsp/photosearch_pageADV.jsp

Santa Monica Professional Building, 710 Wilshire Blvd. Note the subtle tonal variations in the faux ashlar blocks, most apparent in the shadow at upper left of center, appear slightly more pronounced than the slightly earlier photos. Differential soiling or moisture retention may already be enhancing the differences.

American Storage Company Tower, Arthur E. Harvey, Architect 1928-1929. The American Storage Company Tower is located at 3636 N. Virgil Avenue north of MacArthur Park and south of Silver Lake.

Image circa 1928-29.

American Storage Company Tower, detail.



Subtle tonal differences in the waste-mold formed concrete walls emphasize the faux ashlar effect. Was this achieved by deliberate toning of the cast concrete, or perhaps modifying texture from “block” to “block”?

Note contrast in tone between front pillars of arcade and the rest of the faux ashlar surfaces of the building. A white stucco finish may have been applied here for aesthetic effect, perhaps similar to that detected at 710 Wilshire.

Chateau Elysee. Subtle “block” by “block” differences in tone are seen in this early photograph, enhancing the faux ashlar effect of the waste mold formed concrete. It is reasonable to assume that such aesthetic refinements may have been made at 710 Wilshire.

Chateau Elysee. Detail of subtle “block” by “block” differences in tone.

Chattel, Inc. | Historic Preservation Consultants

February 14, 2014

VIA EMAIL

Mr. Howard Laks, AIA
Howard Laks Architects
1545 12th Street
Santa Monica, CA 90401

RE: Conformance Review Report
710 Wilshire Boulevard, Santa Monica, CA

Dear Howard,

We have been asked to evaluate the proposed project at 710 Wilshire Boulevard (710 Wilshire) for conformance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties (Secretary's Standards).* The project site contains the Santa Monica Professional Building, constructed in 1928 and designated a Santa Monica City Landmark in 2005. The project includes rehabilitation of the Santa Monica Professional Building (also "historic building") and construction of a new six story building with a penthouse for use as a hotel.

Qualifications
Chattel, Inc. (Chattel) is a full service historic preservation consulting firm with a statewide practice. Comprised of professionals meeting the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61) in architectural history and historic architecture, the firm offers professional services including historic resources evaluation and project effects analysis, and consultation on federal, state and local historic preservation statutes and regulations. Chattel is committed to responsible preservation, but recognizes that we live in a real world. Assessing effects on historic resources requires not only professional expertise, but the ability to work effectively toward consensus and compromise. Chattel staff members work collaboratively on individual projects. This report was prepared by President Robert Chattel and Associate Marissa Moshier. Mr. Chattel meets the Secretary of the Interior's Professional Qualifications Standards in architecture, historic architecture, history and architectural history. Ms. Moshier meets the Secretary of the Interior's Professional Qualifications Standards in history and architectural history.

Description of Proposed Project
The proposed project involves rehabilitation of the Santa Monica Professional Building to contain ground floor retail spaces and 55 hotel rooms and construction of a new six story building with penthouse to the south and east to contain meeting rooms, ground floor retail spaces, and 220 hotel rooms. Parking will be provided on four subterranean levels beneath the new building, connected to the Santa Monica Professional Building via a pedestrian tunnel at the basement level. The Santa Monica Professional Building will also be connected to the new building through a pedestrian bridge at the podium level.

13417 Ventura Boulevard, Sherman Oaks, CA 91423-3938 Phone 818-788-7954 Fax 818-788-9795 www.chattel.us

Review of the proposed project is based on architectural drawings prepared by Howard Laks Architects and structural drawings by Structural Focus dated February 1, 2013. Additional information on the condition of historic features and finishes was provided by Griswold Conservation Associates (GCA) in a report dated November 27, 2013. Chattel collaborated with Howard Laks Architects in development of the project design, will continue to collaborate with the project team, and will regularly review the proposed project for conformance with the *Secretary's Standards.*

Rehabilitation of Santa Monica Professional Building

Structural
Structural work associated with rehabilitation of the historic building includes construction of reinforced concrete shear walls at the basement and first floor levels and fiber-reinforced polymer (FRP) wrap on existing interior structural columns and perimeter walls. Reinforced concrete may be shotcrete or cast in place. Shoring associated with excavation of the subterranean parking garage will be placed a minimum of four feet, four inches from the historic building wall and foundation. Based on five test pits excavated under the direction of structural engineer, Structural Focus, the footings and grade beam appear to have been constructed as shown in historic drawings of the building and do not extend into the area proposed for excavation (Attachment 1: Structural Focus Site Visit Report).

Exterior Elevations
The historic exterior elevations with ashlar patterned waste mold concrete are covered with multiple layers of paint, including an elastomeric coating. Based on a moisture assessment with thermal imaging performed by Griswold Conservation Associates, the elastomeric coating does not appear to be trapping excess moisture against the building or causing deterioration of historic material. On the upper levels, the elastomeric coating will be removed only in limited areas where localized failure is visible, using medium pressure washing to loosen compromised areas. On the ground floor and podium level, the elastomeric coating will be removed to uncover the historic finish of waste mold and cast stone decorative details. On the south and east elevations, the ashlar patterned waste mold concrete will be restored in locations where exterior reinforced concrete shear walls were previously constructed.

Windows
Steel sash casement windows will be retained and rehabilitated. Hardware will be repaired, and paint will be removed. After paint removal, the steel frames and sashes will be painted with an enamel finish to replicate the historic chemical patina found underneath the existing paint by Griswold Conservation Associates. To achieve the acoustical performance required for hotel rooms, interior storm windows will be installed. Interior storm windows will be operable casement windows, each with a single vertical light to match the width of the sash in the historic casement windows. Existing glazing will be retained in historic windows to the greatest extent feasible or replaced with matching clear glazing where necessary. No other coatings or tints are proposed for the glazing.

Storefronts
The storefronts have historic wood perimeter trim with added contemporary brake metal. The majority of storefront doors have been replaced. The existing bulkhead and wood trim will be retained, and storefront glazing and brake metal will be removed and replaced. Historic wood transoms will be retained, made operable as they were historically, and fixed in place. Rehabilitation

will include new wood doors with wide stiles and rails in keeping with historic storefront doors. Decorative twisted metal ropes flanking the storefronts and twisted metal pickets at the transoms will be cleaned, paint removed, and repaired as necessary. All retail signage and awnings will be removed from storefronts on Wilshire Boulevard and 7th Street. Interior retail spaces will be finished as tenant improvements.

New storefronts will be opened on the secondary east elevation ground floor, in the area covered by the existing adjoining building, which will be demolished as part of the project. The openings will be saw cut and filled with storefronts with black anodized aluminum brake metal and clear glazing. Three bays in the secondary south elevation will also be opened to create a covered outdoor seating area. This area originally contained the ambulance entrance for medical offices in the historic building.

Roof
The composition shingle cladding on the mansard and hipped roof will be removed and replaced with terra cotta Mission tiles, as visible in historic photographs of the building. The tiles will be a natural red color, Gladding McBean Blended Red and installed with a tile strap system, equal to Newport Tool & Fastener Co. “Tyle-Tye.” Deteriorated cast stone elements will be stabilized, pinned and anchored as necessary. Missing cast stone finials will be reconstructed in cast stone based on existing examples and historic photographs. The building’s penthouses will be not used, because the elevator does not extend to these areas and they cannot be made accessible in compliance with code requirements. Use of the penthouses would also exceed the project’s maximum floor area ratio.

Podium
At the podium level, terra cotta Mission tiles at the parapet coping have been overpainted. If feasible, the tiles will be salvaged, overpaint removed without damaging the skin of the fired ceramic, and reinstalled. Damaged tiles will be replaced in kind. Planters are proposed for the podium level to recreate the historic appearance of a planted roof from the street. Raised fiberglass planters will contain trees and shrubs typical of plantings visible in historic photographs. Green screen planters will be used to separate individual guestroom terraces. Hotel rooms at the podium level will open onto the podium through nine historic windows converted into doors. The proposed doors will fit exactly the width of the historic window openings. Window sills will be saw cut and removed. Removed windows will be salvaged and used for parts to repair retained windows. The proposed doors will be steel sash with glazing and pattern of lights to match the historic casement windows. The alterations will be minimally visible from the street.

The new building will connect to the historic building at the podium level. A pedestrian bridge will connect to the south elevation of the historic building at the current location of the fire escape. The pedestrian bridge will have a minimal connection to the historic building with limited removal of historic materials. The existing width of the opening at the fire escape will be enlarged to accommodate a new double door entrance from the pedestrian bridge.

Fire Escape
The fire escape ladders will be removed and the floors infilled. The existing metal railing are substandard height and will be replaced with a 42 inch tall metal guardrail to match the existing railing with alternating ½ inch twisted and square metal pickets. At each floor, the existing window will be converted into a door accessing the fire escape. The proposed door will fit exactly the width

of the historic window openings. Window sills will be saw cut and removed. Removed windows will be salvaged and used for parts to repair retained windows. The proposed doors will be steel sash with glazing and pattern of lights to match the historic windows.

Ground Floor Lobby
Contemporary suspended ceilings will be removed. Based on Chattel's visual inspection of the lobby, the original plaster ceilings have been removed. Mechanical equipment will be concealed above the ceiling, and the new lobby ceiling will be vaulted based on the proportions of the historic ceiling shown in original drawings of the building. The historic inlaid marble floor will be retained, protected in place during construction, and patched as necessary.

Circulation
The distinctive double-loaded, Y-shaped corridors and curved stair of the historic building's upper floors will be retained. A fully code compliant new stair will be constructed at the southeast corner of the building. The upper floor corridors have limited extant historic materials in the form of decorative surrounds at openings to the stairwell and elevators. The historic stairwell was previously open to the corridor at each floor. The project team submitted an Application for Alternate Materials & Methods (AM&M) to the Santa Monica Building and Safety Division to re-open the enclosed stairwell at each floor. Clear fire-rated glazing will be installed over the corridor openings. The stairwell door at each floor will be held open using a magnetic attachment tied to the building's smoke detection system. The AM&M also requested an exemption from a requirement to accommodate a stretcher in the building's elevator. The historic elevator shaft is too small for a cab that could fit a stretcher, and compliance with this requirement would require enlarging the elevator shaft and impacting the historic building's structure. The AM&M has been approved, allowing the historic stair openings and elevator to be retained (Attachment 2: AM&M).

The marble treads and decorative metal handrails of the stair at the upper floors will be retained and protected in place during construction. No modifications are proposed to the historic handrail. A new code compliant handrail is proposed at the perimeter of the historic stair.

Mechanical Electrical Plumbing (MEP) Systems
The new MEP systems will use flat pancake ducts at the corridors to allow the corridor ceilings to be retained at the existing height. The guestrooms will have finished hard lid ceilings at the existing height, lowered to accommodate fan coil units at the entrances. Venting on the roof will be consolidated to the greatest extent feasible and minimally visible.

<u>Construction of New Building</u>
The Santa Monica Professional Building is a six story building with a Y- shaped five story tower above a high volume first floor podium. At six stories with a penthouse, the new building is comparable in height and scale. At all elevations, the mass of the new building is set back from the historic building, allowing the historic building to read as a separate and distinct structure. Both buildings are similarly composed of a high volume first floor podium with a tower element above. The podiums of the new building and historic building are at the same height. The podium composition of both buildings activates the space between the two buildings with retail and outdoor dining and gives both buildings similar outdoor terrace functions at the second floor. The podium of the new building also serves to reduce the mass of the new building immediately adjacent to the historic building on 7th Street.

The curved wings of the new building are angled to reflect the Y-shaped plan of the historic building, while the smooth curves are clearly differentiated from the faceted, angular tower of the historic building. The wing of the new building on Wilshire Boulevard is recessed from the street edge to allow primary views of the historic building to predominate. In keeping with the decorative cast stone beltway at the sixth floor of the historic building, the sixth floor of the new building is highlighted through a wall of windows inset from the concrete building face. The proportions of the narrow windows in the new building echo the proportions of the upper floor windows in the historic building, and the smooth concrete finish of the new building is differentiated from the ashlar pattern concrete finish of the historic building.

The new building will connect to the historic building in two locations: 1) at the basement level, and 2) at the podium level. At the podium level, the connection will be through a bridge which "kisses" the south elevation of the historic building. The basement connection is for service, rather than public use. These two physical connections are minimized to the greatest extent possible. This composition retains all elevations of the distinctive Y-shaped tower while allowing both buildings to function as a whole with substantial new use of the site.

Secretary's Standards

The Development Agreement between the developer and the City of Santa Monica establishes a Joint Design Review Body (JDRB), consisting of members from the Architectural Review Board and the Landmarks Commission, to review and approve a Certificate of Appropriateness for the proposed project. The JDRB shall review the proposed project in accordance with provisions of the Santa Monica Municipal Code §9.36.140, which requires use of the *Secretary's Standards* "in evaluating any proposed alteration, restoration, or construction, in whole or in part, of or to a Landmark [or] Landmark Parcel."

The *Secretary's Standards* are not intended to be prescriptive, but instead provide general guidance. They are intended to be flexible and adaptable to specific project conditions to balance continuity and change while retaining historic building fabric to the maximum extent feasible. Their interpretation requires exercise of professional judgment, taking into account various opportunities and constraints of any given project based on use, materials retention and treatment, and compatibility of new construction. Not every standard necessarily applies to every aspect of a project, nor is it necessary to comply with every standard to achieve conformance. The *Secretary's Standards* contain four treatments; the appropriate treatment for this project is rehabilitation. The rehabilitation standards are:

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.

6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Conformance with *Secretary's Standards*
The proposed project appears to conform with the *Secretary's Standards*. In conformance with Standard 1, the proposed project retains the distinctive character-defining features of the historic building while allowing for new hotel use. In conformance with Standards 2, 5, and 6, rehabilitation of the Santa Monica Professional Building will retain and repair historic materials to the greatest extent feasible. Deteriorated historic materials will be replaced in kind only when necessary, and missing historic features will be reconstructed based on physical and documentary evidence. In conformance with Standards 9 and 10, the new building is compatible with the historic building in mass, scale and materials and is clearly differentiated from the historic building through its design. The two physical connections to be established between the historic building and new building are minimal and reversible with limited impacts to historic materials.

Mitigation Measures
The proposed project is subject to Historic Resources (HR) Mitigation Measures in the project's Final Environmental Impact Report (FEIR).

> HR-1 Building Materials
> In accordance with the *Secretary of the Interior's Standards*, the material and finish of the exterior walls of the new construction (not including new construction at the 1218 Lincoln Boulevard property) shall be compatible with, but should also be differentiated from the existing Landmark Santa Monica Professional Building. The design review body shall pay shall pay particular attention to the Landmark building's character-defining features including the "Y-shaped plan" and richly embellished ornamentation in relief, particularly surrounding the main entrance, 6th floor elevations, and penthouse wings.

Compliance with HR-1
As described above, design of the new building is in conformance with the *Secretary's Standards*. The new building is comparable in height, scale and mass to the historic building. The curving wings of the new building reflect and are deferential to the distinctive Y-shaped tower of the historic building. The mass of the new building is reduced through the use of the podium, the curving wings, and multiple inset sections of the building on 7th Street and on the alley to the east. The decorative

details of the historic building will be retained and rehabilitated, while the details and materials of the new building are clearly differentiated from the historic building.

> HR-2(a) Secretary of the Interior Standards
> The rehabilitation of the Santa Monica Professional Building shall be undertaken with the assistance of a historic preservation architect meeting the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, Professional Qualifications Standards*. The historic preservation architect will regularly review the ongoing rehabilitation to ensure it continues to satisfy the conditions of the Certificate of Appropriateness. The historic preservation architect will submit status reports to the City of Santa Monica's Landmarks Commission Liaison according to a schedule agreed upon prior to commencement of the rehabilitation.

Compliance with HR-2(a)
Chattel has been engaged to serve as historic preservation architect for the project, using Chattel staff members who meet the *Professional Qualifications Standards*. Chattel will regularly review the project for conformance with the Secretary's Standards and with conditions of the Certificate of Appropriateness and will provide updates to City staff as required under these mitigation measures.

> HR-2(b) Secretary of the Interior Standards
> As described in Section 9.36.140 of the Santa Monica Municipal Code, the Landmarks Commission shall use the Secretary of the Interior's Standards in evaluating the proposed rehabilitation of the Santa Monica Professional Building. In order to issue a Certificate of Appropriateness, the Landmarks Commission, or the City Council on appeal, will determine whether the rehabilitation satisfies the criteria for issuance of a Certificate of Appropriateness pursuant to the Santa Monica Municipal Code Section 9.36.140. In particular, any proposed repair of the building's windows, which define the building's upper stories, should be done in accordance with the *Secretary of the Interior's Standards for Rehabilitation* with particular attention given to the pattern, sash type, and dimensions of the historic building's existing windows.

Compliance with HR-2(b)
As described above, rehabilitation of the historic building is in conformance with the *Secretary's Standards*. Historic materials will be retained and rehabilitated to the greatest extent feasible. The historic steel sash windows will be retained and will remain operable. The existing windows will be supplemented with interior storm windows to achieve the acoustical performance required for hotel guest rooms. The interior storm windows will be minimally visible from the exterior of the building.

> HR-3(a) Protection of Building during Excavation and Construction
> A registered structural engineer, with a minimum of five years of experience in the rehabilitation and restoration of historic buildings, shall investigate the existing relationship of the foundation of the Santa Monica Professional Building along the east elevation to the foundation of the existing building at 718 Wilshire Boulevard. Any required test excavations shall be performed only in the presence of the structural engineer. The structural engineer shall prepare a report of findings, recommendations and any related design modifications necessary to retain the structural integrity of the Santa Monica Professional Building.

The structural engineer (in consultation with a historic preservation architect, meeting the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, Professional Qualifications Standards*) shall prepare designs and specifications for protective barriers required to protect the east wall of the Santa Monica Professional Building from potential damage caused by construction activities. In addition, the structural engineer (with geotechnical consultation as necessary) shall determine whether, due to the nature of the excavations, soils, method of soil removal and the existing foundations of the historic buildings, the potential for settlement would require underpinning and/or shoring. If underpinning and/or shoring is determined to be necessary, appropriate designs shall be prepared. All documents prepared in accordance with this Measure shall be reviewed and approved by the City of Santa Monica's Historic Preservation Officer, after consultation with appropriate City staff.

Compliance with HR-3(a)
Structural Focus has been engaged to develop plans and prepare a report on the relationship between the foundation of the Santa Monica Professional Building and the foundation of the building at 718 Wilshire Boulevard. Test pits on the south and east sides of the historic building have been dug under the direction of the structural engineer, which indicate that the foundations of the historic building were constructed as shown in historic drawings. Documentation will be submitted to the City's Historic Preservation Officer prior to the start of construction.

HR-3(b) Demolition Monitoring
Prior to demolition of the existing building at 718 Wilshire Boulevard, a historic preservation architect and a structural engineer shall undertake an existing condition study of the Santa Monica Professional Building to establish the baseline condition of the building prior to construction, including the location and extent of any visible cracks or spalls. The documentation shall take the form of written descriptions and photographs, and shall include those physical characteristics of the resource that convey its significance and that justify its inclusion on the local register. The documentation shall be reviewed and approved by the City of Santa Monica's Historic Preservation Officer, after consultation with appropriate City staff ("monitoring team").

The historical architect and structural engineer shall monitor the Santa Monica Professional Building during construction and report any changes to existing conditions, including, but not limited to, expansion of existing cracks, new spalls, or other exterior deterioration. Monitoring reports shall be submitted to the City's Historic Preservation Officer on a periodic basis. The structural engineer shall consult with the historic preservation architect, especially if any problems with character-defining features of a historic resource are discovered. If in the opinion of the structural engineer, in consultation with the historic preservation architect, substantial adverse impacts to historic resources related to construction activities are found during construction, the monitoring team shall so inform the project sponsor or sponsor's designated representative responsible for construction activities.

The project sponsor shall adhere to the monitoring team's recommendations for corrective measures, including halting construction in situations where construction activities would imminently endanger historic resources. The historic preservation officer shall establish the frequency of monitoring and reporting. The project sponsor shall respond to any claims of

damage by inspecting the affected property promptly, but in no case more than five working days after the claim was filed and received by the project sponsor's designated representative. Any new cracks or other changes in the Santa Monica Professional Building shall be compared to pre-construction conditions and a determination made as to whether the proposed project could have caused such damage. In the event that the proposed project is demonstrated to have caused any damage, such damage shall be repaired to the preexisting condition.

Site visit reports and documents associated with claims processing shall be provided to the City of Santa Monica's Historic Preservation Officer.

Compliance with HR-3(b)
Prior to the start of construction, Chattel and Structural Focus will prepare a baseline condition assessment of the historic building for review and approval by the City's Historic Preservation Officer. The project team will regularly monitor the historic building during construction and will provide documentation of site visits and condition assessments to the City's Historic Preservation Officer.

HR-3(c) Vibration Specifications
The qualified structural engineer shall perform the following vibration mitigation:

Prior to commencement of construction activities, measure and document the existing ground vibration environment at the vicinity of the historic buildings to establish baseline vibration conditions. The vibration measurements shall be performed during hours of the day consistent with the project's construction hours. At each site, ground vibration levels shall be measured in the vertical direction for a period of a minimum of 15 minutes. The vibration measurement equipment shall be capable to record the velocity levels in PPV (peak Particle Velocity) and RMS (Root-Mean-Square) values in the unit of inch/ second, over the frequency range of 1 Hz to 100 Hz. Measured vibration data shall be submitted to the City and shall include; description of measurement location, measurement time and recorded values (maximum, minimum and mean levels during the measurement period). After establishing the baseline vibration conditions of the project site, develop and implement a vibration monitoring program capable of documenting the construction related ground vibration levels in the vicinity of the historic buildings. The vibration monitoring system shall be able to measure and store the PPV and RMS values over the band frequency ranges of 1Hz to 100 Hz. The FTA identifies a threshold of95 VdB for extremely fragile historic buildings. In order to ensure that construction activities remain below this threshold, the project vibration criteria shall be 0.12 inch/second (PPV) (equivalent to 90 VdB). The vibration monitoring system shall indicate any instances where the ground vibration levels exceed the project vibration criteria. The vibration monitoring program shall be implemented during the site grading, excavation, and construction of the foundations only. If measurements indicate ground-borne vibration levels approach 0.12 inch/section PPV, the construction procedure/method shall be revised, including the type of equipment used, to maintain the ground-borne vibration requirements (not to exceed 0.12 inch/second PPV) at the historic buildings. The structural engineer will prepare weekly reports for the City to document the vibration monitoring program. Upon completion of construction, the structural engineer shall prepare a report for the City summarizing the results of the vibration monitoring program.

In addition to vibration monitoring by the structural engineer, the architectural historian shall perform visual inspections of the historic buildings (exterior/interior structure, walls/ceilings, etc.) during site grading, excavation, and construction of the foundations, and note any new damages in a monitoring log. Similar to the structural engineer, the architectural historian shall prepare weekly reports for the City to document the vibration monitoring program. Upon completion of construction, the architectural historian shall prepare a report for the City summarizing the results of the vibration monitoring program.

Compliance with HR-3(c)
Under the direction of Structural Focus as the project structural engineer, a vibration monitoring consultant will document baseline vibration conditions and develop and implement a vibration monitoring program in conformance with the vibration specifications. The structural engineer and architectural historian will prepare weekly reports on vibration monitoring for transmittal to City staff.

HR-3(d) Historic Resource Training Program
Prior to demolition of the existing building at 718 Wilshire Boulevard, the historic preservation architect shall establish a training program for construction workers involved in the project that emphasizes protection of historic resources. This program shall include information on recognizing historic fabric and materials, and directions on how to exercise care when working around and operating equipment near the Santa Monica Professional Building, including storage of materials away from the historic building. It shall also include information on means to reduce vibrations from demolition and construction, and monitoring and reporting any potential problems that could affect the historic resource. A provision for establishing this training program shall be incorporated into the contract, and the contract provisions shall be reviewed and approved by the City of Santa Monica's Historic Preservation Officer.

Compliance with HR-3(d)
Chattel will prepare a historic resource training program for construction workers on the project. The program will address character-defining features of the building and appropriate treatment of historic materials in conformance with the *Secretary's Standards*. The training program will be pre-recorded and shown to all construction workers as part of job orientation and safety training. Chattel will be available as needed to answer questions from construction workers.

Performance Bond
Per the terms of the project's Development Agreement, a performance bond will be issued to ensure that rehabilitation of the historic building that has commenced under the Certificate of Appropriateness will be completed.

Conclusion
The proposed rehabilitation of the Santa Monica Professional Building and construction of the new building conforms with the *Secretary's Standards*. Rehabilitation of the historic building retains and repairs historic materials to the greatest extent feasible, while allowing new use of the property. The new building is compatible with the historic building while being clearly differentiated. In compliance with the EIR mitigation measures, the project is in conformance with the *Secretary's Standards*, and a structural engineer and historic preservation consultant have been engaged to regularly review the project for conformance.

Next Steps
As described above, the project is in the design development phase and required elements of the mitigation measures have not yet been completed. Chattel will continue to work with the project team to ensure conformance with the *Secretary's Standards* and with the conditions of the Certificate of Appropriateness. The project team will submit additional documentation to demonstrate compliance with the mitigation measures to the City's Historic Preservation Officer on the timeline described below.

Milestone	**Action**	**Mitigation Measure**
75% Design Development	Historic preservation consultant and structural engineer to complete baseline condition assessment of historic building	HR-3(b)
	Structural engineer to prepare report on foundation condition of historic building in relation to foundation of 718 Wilshire Boulevard building	HR-3(a)
90% Design Development	Historic preservation consultant to prepare follow up report describing project's conformance with *Secretary's Standards* and conditions of Certificate of Appropriateness	HR-2(a) and HR-2(b)
Prior to Issuance of Demolition Permit	Structural engineer, with vibration monitoring consultant, to develop vibration monitoring program	HR-3(c)
Prior to Issuance of Demolition Permit	Historic preservation consultant to develop historic resource training program for construction workers	HR-3(d)

Very truly yours,

CHATTEL, INC.

By: _____
Robert Jay Chattel, AIA, President
California Architect License No. C27398

SECTION 02 0500
SITE REMEDIATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 WORK INCLUDED

A. The Work of this Section includes all labor, materials, equipment and services necessary to complete all clearing and grubbing together with the removal and disposal of items, as shown on the drawings and as specified herein, complete.

1. Remove all trees, plants and site materials that have been designated for demolition, after receiving approval from Agency's Representative.

1.3 RELATED WORK

A. Plant Protection and Pruning. Section 32 0190.33

B. Landscape Irrigation. Section 32 8000

C. Landscaping. Section 32 9000

D. Maintenance. Section 32 0100

1.4 JOB CONDITIONS

A. Condition of Premises: Accept the premises as found and clear the Project site as specified.

B. Protection:

1. Existing Vegetation: Protect from damage individual trees, groups of trees, shrubbery, lawns and other vegetation designated to remain. Replace at Contractor's expense items damaged or destroyed with like items in sizes and quantity of the damaged or destroyed material. Assessment of material value shall be established by a Certified Arborist.

2. Protect existing utilities shown to remain.

3. Provide barricades and guards as required to protect trees or existing improvements.

4. Existing irrigation lines watering areas outside the limit of work line.

PART 2 - PRODUCTS

Not used

PART 3 - PRODUCTS

3.1 CLEARING AND GRUBBING

A. Verify all trees and shrubs to be removed with Agency's Representative prior to starting any demolition work.

B. Clearing: Fell trees, dispose of the trees and other vegetation designated for remove together with the downed timber, snags, brush and rubbish, occurring within the construction limits. All limbs, branches, and roots damaged during construction, together with those required to be trimmed, shall be neatly cut next to the bole of the tree or main branch or root under the direction of a certified Arborist.

C. Grubbing: Remove and dispose of all stumps above grade, all matted roots and all roots larger than 3 inches in diameter to a depth of 12".

D. Removal: All cleared and grubbed plants and construction debris shall be promptly removed completely away from the Project site. Do not store or permit materials to accumulate on the Project site.

1. Do not burn materials or debris on the premises.

2. Remove all debris from the Project site to a legal dumping area.

3.2 TREE AND TREE STUMP REMOVAL

A. Trees and tree stumps designated for removal shall be removed to 2 feet below finish grade minimum.

END OF SECTION

DIVISION 03

CONCRETE

SECTION 030172

FIBER REINFORCED POLYMER (FRP) SYSTEM

(LANDMARK BUILDING)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This specification is intended to define the minimum requirements of structural strengthening using externally bonded fiber reinforced polymer (FRP) composite systems.

B. The work includes the furnishing of all materials, labor, equipment and services for the supply, installation and finish of all structural strengthening using externally bonded FRP composite system.

C. The general contractor or subcontractor shall furnish all materials, tools, equipment, transportation, necessary storage, access, labor and supervision required for the proper installation of the externally bonded FRP composite system.

1.2 WORK INCLUDED

A. This Section of the Specification is not necessarily complete in itself. Read in conjunction with the Contract Document.

1.3 REFERENCE STANDARDS

A. General: The publications listed below form a part of this specification to the extent referenced. Where a date is given for referenced standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of the Notice of Invitation to Bid shall be used.

B. International Code Council (ICC)
   1. ICC AC125, Acceptance Criteria for Concrete and Reinforced and Unreinforced Masonry Strengthening Using Externally Bonded Fiber Reinforced Polymer (FRP) Composite Systems.
   2. ICC AC178, Interim Criteria for Inspection and Verification of Concrete and Reinforced and Unreinforced Masonry Strengthening Using Externally Bonded Fiber Reinforced (FRP) Composite Systems.

C. American Standard for Testing and Materials (ASTM)
   1. ASTM D3039, Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials.
   2. ASTM D7565, Standard Test Method for Determining Tensile Properties of Fiber Reinforced Polymer Matrix Composites Used for Strengthening of Civil Structures.
   3. ASTM D7522, Standard Test Method for Pull-Off Strength for FRP Bonded to Concrete Substrate.
   4. ASTM D4541, Standard Test Method for Pull-off Strength of Coating Using Portable Adhesive-Testers.
   5. Fire Protection: ASTM E84 (regarding flame spread and smoke development requirement) and ASTM E119 (regarding hourly fire-rated requirement).

D. American Concrete Institute (ACI)
   1. ACI 440.2R-08, Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures.

1.4 MATERIAL QUALIFICATIONS

A. Materials for the FRP system have been pre-qualified and shall be supplied by Fyfe Co. LLC (8380 Miralani Drive, Suite A, San Diego, CA 92126) or an approved alternate. Alternate systems must provide all items listed in Section 1.5 of this specification and submit two-weeks prior to the project bid date.

1.5 SUBMITTALS

A. Quality Control and Quality Assurance:
1. Submit product data indicating product standards, physical and chemical characteristics, technical specifications, limitations, installation instructions, maintenance instructions and general recommendations regarding each individual material. Only epoxy resins will be accepted for construction of FRP systems referenced in this specification. Other resins, such as polyesters/vinyl esters, are not allowed as substitutes. The manufacturer shall clearly define the epoxy resin working time. Any batch that exceeds the batch life shall not be used.
2. Durability Requirements: The proposed FRP systems shall be compliant with all testing requirements as per ICC AC125 and a current ICC Evaluation Service Report compliant with the 2012 International Building Code (IBC) shall be provided (see Section 1.5.C.1 of this specification).
3. Systems shall have an approved ICC Evaluation Service Report for the proposed FRP system(s).
4. Submit a list of completed surface bonded FRP composite strengthening projects completed with the manufacturer's FRP composite system in the past 3 years. The list should include at a minimum 25 projects with proposed FRP system, the dates of work, type, description and amount of work performed.
5. Surface bonded FRP composite system shall be installed by certified applicator with written consent from manufacturer that the contractor has been trained. Certified applicator shall have a minimum of 5 years experience in performing retrofits using FRP systems and submit a list of no fewer than 15 successful installations.
6. The Engineer may suspend the work if the Contractor substitutes an unapproved fiber reinforced composite system or unapproved personnel during construction.

B. Design and working drawings:
1. Stamped and signed structural calculations and drawings by a professional Civil or Structural Engineer. Design shall be based on the performance criteria defined on the structural drawings. The design FRP properties shall be based on published values, consistent with long-term durability testing.
2. Working drawings shall detail the type, locations, dimensions, numbers of layers, and orientation of all FRP materials and coatings to be installed.
3. A list of two different qualified testing laboratories that can perform the required ASTM D7565 and/or ASTM D3039 tests as per Section 3.3 of this specification.

C. Product Information:
1. Properties of the composite materials as determined by independent laboratory testing in accordance with ASTM D 3039 (tensile modulus, stress and strain).
2. Large-scale structural testing results of the proposed composite system from independent laboratories on similar structural sections.
3. Installation procedures, maintenance instructions, and general recommendations regarding each material to be used.
4. Provide a current ICC Evaluation Service Report, compliant with the 2009 IBC, for the proposed products.
5. If fire protection is required, provide approved U.L. rated assembly data for any required fire-resistant finish (2 or 4 hour rated assembly per ASTM E119 or Class A Building, Flame Spread & Smoke Development per ASTM E84) as proposed with the FRP system.
6. Manufacturer’s Material Safety Data Sheets (MSDS) for all materials to be used.
7. Manufacturer’s product data sheet indicating physical, mechanical and chemical characteristics of all materials used in the FRP system. Data sheets to also include properties of the cured FRP laminates as determined by laboratory testing in accordance with ASTM D7565 and/or ASTM D3039 (ultimate and design tensile modulus, stress and strain).
8. Written verification from the manufacturer that their applicator has received the required certifications and training.

9. Certification by the manufacturer that supplied products comply with local regulations controlling use of volatile organic compounds (VOC's). Products that require the use of respirators do not comply with local regulations controlling use of VOC's and shall not be allowed.

1.6 PERFORMANCE

A. Design the composite system to achieve the structural performance shown on the structural drawings and the following data. Design calculations for the composite system shall be submitted for approval by the engineer of record, and shall be stamped by a registered Civil or Structural Engineer. For element stabilization, structural proof-test reports will be required.

B. Calculations shall conform to requirements set forth in the bid documents and be based on the design modulus and associated area of the composite to be installed. FRP design values must be lower than the calculated mean determined from the test results received from the ASTM D7565 and/or ASTM D3039 field test specimens (See Section 3.3 of this specification) and be based on the approved values listed in the ICC ESR. For element stabilization, structural proof-test reports will be required instead of calculations.

1.7 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Deliver epoxy materials in factory-sealed containers with the manufacturer's labels intact and legible with verification of date of manufacture and shelf life.

B. Store materials in a protected area at a temperature between 40°F (4°C) and 100°F (38°C).

C. Products shall be stored according to the manufacturer's requirements and shall avoid contact with soil and moisture. Products shall be stored to avoid UV exposure.

1.8 COORDINATE WITH OTHER TRADES

A. Prior to construction, the trades shall be briefed on any new or unusual construction procedures to ensure that they are aware of special conditions (e.g. new penetrations, construction anomalies).

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS & COMPOSITE STRENGTHENING SYSTEM

A. Fyfe Co. LLC

8380 Miralani Drive, Suite A, San Diego, CA 92126.

Tel: 858-642-0694, Fax: 858-444-2982, email: info@fyfeco.com.

B. Engineer-of-record approved equal that satisfies all of the requirements of Section 1.3 – 1.6 and shows equality to materials defined in Section 2.2. Proposed alternate composite system must be approved in an addendum to these specifications by the engineer of record two-weeks prior to the project bid date.

2.2 COMPOSITE STRENGTHENING SYSTEMS

A. Approved TYFO® Fibrwrap® System to be supplied by Fyfe Company LLC, 8380 Miralani Drive, Suite A, San Diego, CA 92126). listed under ICC ESR 2103- Products include:

1. Composite fabric: SCH fiber – primary carbon fiber, unidirectional.

   SEH fiber – primary glass fiber, unidirectional.

   Alternate primary carbon or glass fiber systems available upon request.

2. Epoxy saturant/primer: Tyfo® S epoxy is used as a primer and is also combined with the fiber to form the Tyfo® Fibrwrap® System.
3. Primer/Filler: Thickened Tyfo® S epoxy for protective seal coat, filling voids (up to 1.5" deep) and primer where needed.

4. Anchorage: Fiber anchors (if required) shall consist of either SCH or SEH unidirectional fibers and shall be saturated with the Tyfo® S epoxy in the field. Anchors shall be prefabricated and shipped directly from the manufacturer. Anchor labels shall have the date of manufacture, the lot number and the minimum weight per unit length for each size.
5. Fire Resistant Coating: Tyfo® RR System (U.L. listing BWSZ.R15357) to provide a class 1 flame and smoke per ASTM E84.
6. Alternate finishes must be approved by the owner.
7. Finishes: See drawings for finish requirements. Alternate finishes must be approved by the owner.
8. Field thickened epoxy matrix, which is compatible with composite system's resin matrix, may be used to patch "bugholes" up to 1.5" (40mm) in depth and to fill voids.
9. Epoxies other than the pre-qualified materials above can be evaluated prior to the tender closing; materials meeting the requirements will be allowed by written addendum.

B. The manufacturer shall provide specific information on physical, mechanical and chemical properties of fiber, epoxy resin and FRP composite.

C. All other alternate FRP system manufacturers must provide all items listed in Section 1.5 of this specification prior to the bid date; otherwise, such system shall be considered non-compliant.

2.3 CERTIFIED APPLICATORS

A. Installations of FRP Systems shall be performed by certified applicators only. Certified applicators shall have the minimum experience and written consent by the FRP manufacturer (See Section 1.5.4 of this specification).

B. The certified applicator regarding the installation of all Tyfo® Fibrwrap® Systems in the State of California is Fibrwrap Construction Services, Inc. (Contact: Chris De Letto, 619-726-8253).

2.4 OTHER MATERIALS

A. Contractor to provide compatible primer, filler and other materials recommended by the manufacturer as needed for the proper installation of the complete surface bonded FRP composite system.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Columns or "Contact-Critical" Applications:
1. The surface to receive the composite shall be free from fins, sharp edges and protrusions that will cause voids behind the installed casing or that, in the opinion of the Engineer of Record, will damage the fibers. Existing uneven surfaces to receive composite shall be filled with the system epoxy filler or other material approved by the Engineer of Record. Filling of large voids in surfaces to receive composite shall be paid as an extra to the contract work of installing the composite system (small pinholes or micro-bubbles in the concrete surface or resin do not require special detailing). The contact surfaces shall have no free moisture on them at the time of application. If moisture is present, use the manufacturer suggested wet prime epoxy, if available.
2. Repair all damaged concrete, spalls, and irregular surfaces to create a flat, or slightly convex, surface. Fill surfaces with thickened epoxy to eliminate air surface voids greater than 0.5" diameter. Well-adhered paint and concrete do not require removal.
3. Round off sharp and chamfered corners to a minimum radius of 0.75" by means of grinding or forming with the system's thickened epoxy. Variations in the radius along the vertical edge shall not exceed 0.5" for each 12" of column height.

B. Slabs/ Walls or "Bond-Critical" Applications:

1. Surfaces shall be prepared for bonding by means of abrasive blasting or grinding to remove existing laitance and expose aggregate [minimum ICRI CSP-2 concrete surface profile]. All contact surfaces shall then be cleaned by hand or compressed air. Prior to the application of the saturated composite fabric, prime surfaces and fill any uneven surfaces with the manufacturer's thickened epoxy. Provide anchorage as detailed on construction drawings, if required.
2. Round off sharp and chamfered corners (to be wrapped around) to a minimum radius of 0.75" by means of grinding or forming with the system's thickened epoxy. Variations in the radius along the edge shall not exceed 0.5" for each 12" of length.

3.2 INSTALLATION

A. Preparation work for project: Visit site to ensure that all patch work is complete and cured. Review project specifications in detail.

B. Verify ambient and concrete temperatures. No work shall proceed if the temperature of the concrete surface is less than 40°F (4°C) or greater than 100°F (38°C) or as specified on the epoxy component labels. The ambient temperature and temperature of the components shall be between 40°F (4°C) and 100°F (38°C), unless provisions have been made to ensure components' temperature is maintained within this range or the range specified by the manufacturer.

C. Prepare the epoxy matrix by combining components at a weight (or volume) ratio specified by the manufacturer. The components of epoxy resin shall be mixed with a mechanical mixer until uniformly mixed, typically 5 minutes at 400-600 rpm.

D. Components that have exceeded their shelf life shall not be used.

E. Saturation of the fabric shall be performed and monitored according to the manufacturer's specified fiber-epoxy resin ratio. Fabric shall be completely saturated prior to application to contact surface in order to ensure complete impregnation. Saturation shall be supervised and checked by the certified installer. Both the epoxy resin and fabric shall be measured accurately, combined, and applied uniformly at the rates shown on the approved working drawings and per manufacturer's recommendations.

F. All cutting of fabrics, mixing of epoxy and combination thereof shall take place in a protected area away from critical structure functions and any electrical equipment.

G. Prepare surfaces as required, including corner preparation.

H. Remove dust and debris by hand or with compressed air as per specification.

I. Clean up and protect area adjacent to element where FRP composite is being applied.

J. Using a roller or trowel, apply one prime coat of epoxy resin to the substrate (2 mil min.). Allow primer to become tacky to the touch.

K. Fill any uneven surfaces or recesses with thickened epoxy.

L. Apply saturated fabric to substrate surface by hand lay-up, using methods that produce a uniform, constant tensile force that is distributed across the entire width of the fabric, and ensure proper orientation of the fabric. Under certain application conditions, the system may be placed entirely by hand methods assuring a uniform, even final appearance. Gaps between composite bands may not exceed 0.5" (12mm) width in the fabric's transverse joint unless otherwise noted on project drawings. A lap length of at least 6" (150mm) is required at all necessary overlaps in the primary fiber direction of the fabric.

M. Apply subsequent layers, continuously or spliced, until designed number of layers is achieved, per project drawings.

N. Using a roller or hand pressure, release or roll out entrapped air, and ensure that each individual layer is firmly embedded and adhered to the preceding layer or substrate.

O. Detail all fabric edges, including termination points and edges, with thickened epoxy.

P. Finish for all vertical applications with the Tyfo RR System (stucco like finish) for all to provide a class 1 flame and smoke rating per ASTM E84. Finish must be applied between 24 and 72 hours after final application of epoxy. If finish is provided beyond 72 hours of the application of the epoxy, the surface must be roughened by hand sanding or brush blasting, prior to finishing.

Q. Finish top of slab with a layer of broadcast dry coarse washed sand to fresh epoxy to provide a mechanical profile for additional finishes.

R. System may incorporate structural fasteners but limitations and detailing must be verified with FRP system manufacturer.

3.3 INSPECTION AND TESTING

A. After installation Field Inspection
1. The contractor shall monitor the mixing of all epoxy components for proper ratio and adherence to manufacturer's recommendations. Record batch numbers for fabric and epoxy used each day, and note locations of installation. Measure square footage of fabric and volume of epoxy used each day. Complete report and submit to Owner, engineer-of-record and FRP composite system manufacturer.
2. A Certified Special Inspector shall periodically observe all aspects of preparation, mixing, and application. All FRP composite applied areas shall be inspected, in accordance with the manufacturer's specifications for voids, bubbles, and delaminations. All defective areas shall be repaired as specified in Section 3.4 "Remedial Works".
3. The contractor shall provide a report signed by a registered professional engineer certifying that the installation is acceptable, complete with the testing reports and photographs.

B. Laboratory Testing - Sampling
1. Record lot number of fabric and epoxy resin used, and location of installation. Measure square footage of fabric and volume of epoxy used each day. Label each sample from each day's production.
2. A "sample batch" shall consist of two 12" by 12" (300mm by 300mm) samples of cured composite (note: one 12" by 12" sample creates 5 coupons for ASTM D7565 and/or ASTM D3039 Tension Tests, see 3.3.5 and 3.3.6 of this specification). A minimum of two "sample batches" shall be made daily. The two "sample batches" will be taken at appropriate times during the day as to ensure the maximum material deviance in the components of the FRP composite.

C. Preparation of Samples
1. Prepare sample on a smooth, flat, level surface covered with polyethylene sheeting, or 16 mil plastic film, prime with epoxy resin. Then place one layer of saturated fabric and apply additional topping of epoxy. Cover with plastic film and squeegee out all bubbles.
2. Samples shall be stored in a sample box and not moved for a minimum 48 hours after casting. The prepared, identified samples shall be given to a pre-approved and experienced testing laboratory. The laboratory shall then precondition samples for 48 hours at 140°F (60 °C) before testing.

D. ASTM D7565 and/or ASTM D3039 – Material Tension Tests
1. Testing specimens shall be cut from samples and tested for ultimate tensile strength, tensile modulus and percentage elongation as per ASTM D7565 and/or ASTM D3039 in the longitudinal fiber direction.
2. Test a minimum of 15% of all samples as per ICC AC178. Tensile properties must meet or exceed FRP composite system properties as defined in project specifications. If one coupon fails, specimens from the same 12" x 12" (300mm x 300mm) sample will be tested. If these specimens also fail, the other 12" x 12" (300mm x 300mm) sample from the same "sample batch" will be tested. In the extreme case that this sample also fails, the remaining "sample batch" for that day will be tested and appropriate remedial measures shall be taken to ensure integrity of the system at locations from the failed "sample batch". In addition, 25% of the remaining samples shall be tested by the same criteria as per ICC AC178.
3. Testing results shall be made available within 3 weeks of sample submission.

E. In-situ Testing-ASTM D7522 and/or ASTM D4541 – Adhesion Tests
1. Direct tension adhesion testing of cored samples shall be conducted using the method described by ASTM D7522 and/or ASTM D4541. A minimum of three tests shall be performed for each day of production or for each 500 ft² (45m²) of FRP application, whichever is less. Pull-off tests shall be performed on a representative adjacent area to the area being strengthened whenever possible. Tests shall be performed on each type of substrate or for each surface preparation technique used.
2. The prepared surface of the bonded FRP system shall be allowed to cure a minimum of 72 hours before execution of the direct tension pull-off test. The locations of the pull-off tests shall be representative and on flat surfaces. If no adjacent areas exist, the tests shall be conducted on areas of the FRP system subjected to relatively low stress during service. The minimum acceptable value for any single tension test is 175 psi. The average of the tests at each location shall not be less than 200 psi. Additional tests may be performed to qualify the work. Each pull-off test is to exhibit a failure mode in the substrate and not the epoxy-to-substrate bond plane.
3. Test locations shall be filled with thickened epoxy after the values have been recorded and verified by the special instructor and the test dollies have been removed.

F. Acceptance Criteria
1. FRP design values must be lower than the calculated mean determined from the test results received from the ASTM D7565 and/or ASTM D3039 field test specimens.
2. Acceptable minimum values for ultimate tensile strength, tensile modulus, and elongation shall not be below the submitted design values unless calculations are performed using the tested values that exhibit an acceptable capacity as per the original design demands and concept.
3. Any values below the submitted design values are considered a failure and require remedial works.

3.4 Remedial Works

A. Small voids and bubbles [on the order of 3” (75mm) diameter] shall be injected or back filled with epoxy.

B. Voids and delamination on the order of 6” (150mm) in diameter or an area of 5” x 5” (135mm x 135mm) shall be reported to the engineer of record and remedial measures shall be submitted by the contractor for approval.

C. In the event that the FRP system does not meet the Acceptance Criteria as per laboratory testing and calculations (refer to Section 3.3.6 of this specification), remedial measures shall be taken. Any structural member where the installed FRP system does not meet the Acceptance Criteria, additional layers shall be installed until the FRP meets design requirements, or any other remediation directed by the Engineer of Record.

3.5 Make Good

A. Make good at no cost to the Owner, any damage to the new or existing structures, property or services caused by the installation and testing of the FRP composite.

3.6 Clean up

A. Remove all surplus material, equipment and debris from the site on completion of the work. Leave the site clean.

END OF SECTION

SECTION 031000

CONCRETE FORMING AND ACCESSORIES

(LANDMARK BUILDING)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Openings for other work.

B. Form accessories.

C. Form stripping.

1.2 RELATED REQUIREMENTS

A. Section 03 20 00 (03200) - Concrete Reinforcing.

B. Section 03 30 00 (03300) - Cast-in-Place Concrete.

C. Section 05 12 00 (05120) - Structural Steel: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.3 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 117 - Standard Specifications for tolerances for Concrete Construction and Materials; latest edition.

C. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute; 2010.

D. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute; 2008.

E. ACI 347 - Guide to Formwork for Concrete; American Concrete Institute; 2004.

F. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers; 2010.

G. PS 1 - Structural Plywood; 2007.

H. ASTM D994 - Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type); latest edition.

I. ASTM D1751- Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); latest edition.

J. ASTM D1752 - Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction; latest edition.

K. State of California, Construction Safety Orders (CAL/OSHA); latest edition.

L. State of California, Code of Regulations (CCR).

M. International Conference of Building Officials, Uniform Building Code with State of California Amendments (CBC); 1998 edition.

N. Design, engineer and construct formwork, shoring and bracing to conform to ACI 301, ACI 347R, CBC and CAL/OSHA requirements; resultant concrete to conform to required shape, line and dimension.

O. The design and engineering of formwork and related shoring is the responsibility of the

Contractor.

1.4 QUALITY ASSURANCE

A. Design formwork under direct supervision of a Professional Civil Engineer experienced in design of concrete formwork and licensed in the state of the local jurisdiction.

PART 2 PRODUCTS

2.1 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.

C. Chamfer outside corners of beams, joists, columns, and walls.

D. Comply with applicable State and local codes with respect to design, fabrication, erection, and removal of formwork.

2.2 WOOD FORM MATERIALS

A. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I, exterior grade or better.

B. Lumber: Douglas Fir species; No. 2 grade or better; with grade stamp clearly visible.

2.3 FORMWORK ACCESSORIES

A. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

B. Corners: Filleted, rigid plastic type; 3/4x3/4 inch size, unless otherwise indicated on the drawings; maximum possible lengths.

C. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00 (05120).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members that are not indicated on drawings.

F. Provide fillet and chamfer strips on external corners of beams, joists, columns, and walls.

G. Install polystyrene void forms in accordance with manufacturer's recommendations at areas indicated in the Contract Documents. Protect forms from moisture or crushing.

H. Coordinate this section with other sections of work that require attachment of components to formwork.

I. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Owner's Representative before proceeding.

3.4 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

3.8 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 (01400).

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are

secure.

C. The Owner's Representative will approve the reuse of forms provided the wood formwork edges and surfaces are in good condition, and if it is straight, clean, free from nails, dirt, hardened concrete, and other harmful matter concrete surfaces to be exposed to view. Do not patch formwork.

3.9 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

SECTION 031513

WATERSTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 031000 - Concrete Forming and Accessories.
   2. Section 032000 - Concrete Reinforcing.
   3. Section 033000 - Cast-In-Place Concrete.

1.2 SYSTEM DESCRIPTION

A. Waterstop System: Consists of following components and functions:
   1. Embedded in concrete and spanning control joints and construction joints.
   2. Creates continuous diaphragm to prevent water infiltration.
   3. Provide in each cold joint at all exterior locations, above and below grade.

B. Drawings: Diagrammatic and are intended to establish basic system layout.

C. Interface With Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections for structural members in installation.
   3. Accommodate adjacent waterproofing and weep systems.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit following:
   1. Product data for components and for system.
   2. Installation instructions.
   3. Recommendations for cleaning and preparing surfaces to receive waterstop.
   4. Property specifications for waterstop materials.
   5. Include sample of warranty customized for this Project.

C. Informational Submittals: Submit following packaged separately from other submittals:
   1. Manufacturer’s and installers qualifications.
   2. Certifications specified in Quality Assurance article.
   3. Manufacturer's instructions.

D. Closeout Submittals: Submit following in accordance with Section 017800.
   1. Warranty.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish materials from one manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum ten years experience.

C. Installer Qualifications: Acceptable to manufacturer with experience on at least five projects of similar nature in past five years.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Section 016000.

B. Store materials and accessories off ground in ventilated and protected area to prevent damage and deterioration from moisture and sunlight.

1.6 PROJECT CONDITIONS

A. Environmental Requirements: Comply with more restrictive of following or manufacturer’s written requirements under which products can be installed.

1.7 SEQUENCING

A. Place delivery system as concrete installation proceeds, in accordance with manufacturer's instruction.

1.8 WARRANTY

A. Special Warranty: Prepare and submit in accordance with Section 017800. Warrant installation as watertight for period of 10 years.

PART 2 - PRODUCTS

2.1 SELF-EXPANDING STRIP WATERSTOPS

A. Waterstops: As recommended by manufacturer based on admixture used:
   1. Basis of Design: Volclay Bentonite waterstop by CETCO.
      a. RX-101 is to be used in all concrete cold joint locations where the concrete is greater than 8” thick.
      b. RX-102 is to be used at concrete cold joint locations and details where the concrete is less than 8” thick.
   2. Other proprietary waterstops as acceptable by manufacturer.

B. Accessories: Furnish adhesives, sealants, and epoxy gels as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Examine conditions and proceed with work in accordance with Section 017300.

3.2 WATERSTOPS

A. Install in accordance with manufacturer's printed instructions.

B. Install same day or within 24 hours of concrete pour.

C. Self-Expanding Strip Waterstops:
   1. Install in construction joints and other locations indicated.
   2. Install with adhesive bonding and mechanical fastening.
   3. Firmly press into place.
   4. Install in longest lengths practicable.

D. Support and protect from displacement by concrete placement and subsequent construction.

3.3 CLEANING

A. General: Comply with Section 017400. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.

END OF SECTION

SECTION 032000

CONCRETE REINFORCING

(LANDMARK BUILDING)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.2 RELATED REQUIREMENTS

A. Section 03 10 00 (03100) - Concrete Forming and Accessories.

B. Section 03 30 00 (03300) - Cast-in-Place Concrete.

1.3 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for tolerances for Concrete Construction and Materials; latest edition.

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.

C. ACI 318 - Building Code Requirements For Structural Concrete and Commentary; American Concrete Institute International; 2008.

D. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International; 2004.

E. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.

F. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2006 (Reapproved 2011).

G. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

H. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2012.

I. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2009b.

J. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; American Welding Society; 2011.

K. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute; 2001.

L. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute; Eighth Edition.

1.4 SUBMITTALS

A. See Section 01 30 00 (01300) - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include size, spacing and configuration of reinforcement, bar schedules, shapes of bent bars, spacing of bars, and location of splices.

1. Shop drawings shall not be reproductions of the construction documents.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this

project meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with CRSI (DA4), CRSI (P1), ACI 301, ACI SP-66, ACI 318, and ASTM A 184/A 184M.

1. Maintain one copy of each document on project site.

B. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.6 SOURCE QUALITY CONTROL

A. The Owner's Testing Laboratory will:

1. Collect mill test reports (tensile and bend test) for reinforcement. Review the test data for tensile and bond tests of the reinforcement if mill certificates are not submitted. Tests shall be performed by the Contractor's testing agency. The number of tests shall be in accordance with the CSRI Manual of Standard Practice.

2. Review the test data on mechanical couplers to confirm that the 160 percent of the specified yield strength is obtained and to confirm that a strain of 10 times the yield point strain is developed in the bars adjacent to the couplers. The Contractor's independent testing laboratory shall perform the tests.

3. Review the Welding Procedure Specifications (WPS) and test data needed to qualify welding. Perform necessary tests of samples provided by a Contractor to qualify the welds.

4. Perform radiographic examinations on at least 25 percent of all shop welded splices. For each weld found to be defective, 100 percent of all welds will be tested until five consecutive welds are found to have no defects.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M Grade 60 (420).

1. Plain billet-steel bars.

2. Unfinished.

B. Reinforcing Steel: ASTM A 706/A 706M, deformed low-alloy steel bars, where indicated in the documents.

1. Unfinished.

C. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.

1. Flat Sheets.

2. Mesh Size and Wire Gage: As indicated on drawings.

D. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage.

2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.

4. Mechanical Couplers shall be capable of developing 160 percent of the specified

yield strength of the bar and shall develop a minimum of 10 times the yield point strain in the connected reinforcing bars.

2.2 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice and ACI 318.

B. Welding of reinforcement is permitted only with the specific approval of the Owner's Representative. Perform welding in accordance with AWS D1.4.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress. Splice no more than 50 percent of the bars at any section. Show all splice locations on the shop drawings.

1. Review locations of splices with the Owner's Representative.

PART 3 EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Conform to applicable code for concrete cover over reinforcement, unless otherwise indicated as greater cover in the drawings.

3.2 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 40 00 (01400), will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

(LANDMARK BUILDING)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Slabs on grade.

B. Joint devices associated with concrete work.

C. Miscellaneous concrete elements, including equipment pads, light pole bases, flagpole bases, thrust blocks, manholes, and curbs.

D. Concrete curing.

E. Mechanical anchors, adhesive anchors and adhesive dowels in concrete.

1.2 RELATED REQUIREMENTS

A. Section 03 10 00 (03100) - Concrete Forming and Accessories: Forms and accessories for formwork.

B. Section 03 20 00 (03200) - Concrete Reinforcing.

1.3 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).

B. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; American Concrete Institute International; 1998 (Reapproved 2004).

C. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.

D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (errata 2007).

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.

F. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.

G. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 2010.

H. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).

I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2008.

J. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

K. ASTM A497/A497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2007.

L. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2012.

M. ASTM A 706/A 706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2001.

N. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2011a.

O. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2012.

P. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2012.

Q. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2011b.

R. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2010a.

S. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.

T. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.

U. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2010b.

V. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

W. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

X. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete; 2009.

Y. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2011.

Z. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2012.

AA. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2010.

AB. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 1999 (Reapproved 2008).

AC. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2011.

AD. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2011.

AE. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type); 2011.

AF. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2008).

AG. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 1996 (Reapproved 2008).

AH. ASTM E 1155M - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers [Metric]; 1996 (Reapproved 2008).

AI. COE CRD-C 513 - COE Specifications for Rubber Waterstops; Corps of Engineers; 1974.

AJ. COE CRD-C 572 - Corps of Engineers Specifications for Polyvinylchloride Waterstop; Corps of Engineers; 1974.

1.4 SUBMITTALS

A. See Section 01 30 00 (01300) - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

D. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

E. Concrete Slab-on-Grade and Elevated Concrete Slab Construction Joint Plans: Submit layout plans indicated the location of proposed construction joints.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

1. Maintain one copy of each document on site.

B. Acquire cement from same source and aggregate from same source for entire project.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.1 FORMWORK

A. Comply with requirements of Section 03 10 00 (03100).

2.2 REINFORCEMENT

A. Comply with requirements of Section 03 20 00 (03200).

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C 33.

C. Lightweight Aggregate: ASTM C 330.

D. Fly Ash: ASTM C618, Class C or F.

E. Calcined Pozzolan: ASTM C618, Class N.

F. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

G. Water: Clean and not detrimental to concrete.

2.4 CHEMICAL ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260.

C. Chemical Admixtures: ASTM C 494/C 494M, Type A - Water Reducing, Type B - Retarding, Type D - Water Reducing and Retarding, Type F - Water Reducing, High Range, and Type G - Water Reducing, High Range and Retarding.

1. Provide products manufactured by Sika, Master Builders or W.R. Grace.

2. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

2.5 ACCESSORY MATERIALS

A. Vapor Barrier: 6 mil thick clear polyethylene film, type recommended for below grade application. Lap joints minimum 6 inches and seal watertight by taping edges and ends. Provide sand as indicated on drawings.

B. Sand Fill: Sand fill under interior slabs on grade shall be clean sand with 100 percent passing No. 20 sieve and 5 percent passing No. 200 sieve.

C. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. Minimum Compressive Strength at 48 Hours: 2,400 psi.

2. Minimum Compressive Strength at 28 Days: 7,000 psi.

D. Moisture-Retaining Cover: ASTM C 171; regular curing paper, white curing paper, clear polyethylene, white polyethylene, or white burlap-polyethylene sheet.

E. Liquid Curing Compound: ASTM C 309, Type 1-D, clear or translucent with fugitive dye. Curing compound used on exposed concrete surfaces shall be non-discoloring, fast drying and shall be conclusively demonstrated not to darken or yellow with age. Curing compound for use on concrete floor surfaces to receive resilient tile or other adherent covering shall be specially formulated for such use and shall be certified by the manufacturer not to inhibit the bonding qualities of flooring adhesives.

2.6 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059 Type II.

B. Epoxy Bonding System: Complying with ASTM C881/C881M and of Type required for specific application.

C. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

D. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard or felt, complying with ASTM D 1751, 1/4 inch thick and 4 inches deep; tongue and groove profile.

E. Joint Filler: Compressible asphalt mastic with felt facers, complying with ASTM D 994, 1/4 inch thick and 4 inches deep.

2.7 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound, that dissipates within 3 to 5 weeks; complying with ASTM C309.

2.8 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.

C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

1. For trial mixtures method, employ independent testing agency acceptable to the Owner's Representative for preparing and reporting proposed mix designs.

D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

E. Class A Concrete: For use in foundations, grade beams, miscellaneous curbs, and housekeeping pads.

1. Normal weight: Dry unit weight not less than 144 lbs or more than 150 lbs per cubic foot.
2. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4000 psi.
3. Water-Cementitious Material Ratio: Maximum 0.57 by weight for non-air-entrained concrete and 0.48 by weight for air-entrained concrete.
4. Air-Entrained Admixture (if required): Shall produce an air content of 4 percent, per ASTM C 173.
5. Maximum Slump: 3 inches at point of discharge from truck, or 8 inches for concrete containing a high range water reducing admixture (superplasticizer).
6. Maximum Coarse Aggregate Size: 3/4 inch.

F. Class B Concrete: For use in slabs on grade.

1. Normal weight: Dry unit weight not less than 144 lbs or more than 150 lbs per cubic foot.
2. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4000 psi.
3. Water-Cementitious Material Ratio: Maximum 0.50 by weight for non-air-entrained concrete and 0.45 by weight for air-entrained concrete.
4. Air-Entrained Admixture (if required): Shall produce an air content of 3 percent, per ASTM C 173.
5. Maximum Slump: 3 inches at point of discharge from truck, or 8 inches for concrete containing a high range water reducing admixture (superplasticizer).
6. Maximum Coarse Aggregate Size: 1 inch, 1 1/2 inch may be used at slabs on grade to achieve drying shrinkage limits.
7. Maximum Coarse Aggregate Size at congested areas: 3/8 inch with a high range water-reducing admixture when approved by the Owner's Representative.
8. Drying Shrinkage: Limit drying shrinkage in slabs on grade to 0.050 percent after 28 days of drying.

G. Class C Concrete: For use in walls and columns.

1. Normal weight: Dry unit weight not less than 144 lbs or more than 150 lbs per cubic foot.
2. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 4000 psi.
3. Water-Cementitious Material Ratio: Maximum 0.50 by weight for non-air-entrained concrete and 0.45 by weight for air-entrained concrete.
4. Air-Entrained Admixture (if required): Shall produce an air content of 3 percent, per ASTM C 173.
5. Maximum Slump: 3 inches at point of discharge from truck, or 8 inches for concrete containing a high range water reducing admixture (superplasticizer).
6. Maximum Coarse Aggregate Size: 1 inch
7. Maximum Coarse Aggregate Size at congested areas: 3/8 inch with a high range water-reducing admixture when approved by the Owner's Representative.

H. Class D Concrete: For use in normal weight fill on metal deck.

1. Normal weight: Dry unit weight not less than 144 lbs or more than 150 lbs per cubic foot.
2. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: As indicated on drawings.
4. Water-Cementitious Material Ratio: Maximum 0.50 by weight for non-air-entrained concrete and 0.45 by weight for air-entrained concrete.
5. Air-Entrained Admixture (if required): Shall produce an air content of 3 percent, per ASTM C 173.
6. Maximum Slump: 3 inches at point of discharge from truck, or 8 inches for concrete containing a high range water reducing admixture (superplasticizer).
7. Maximum Coarse Aggregate Size: 1 inch

I. The shrinkage limits for each class of concrete are for laboratory specimens prepared in accordance with ASTM C192 and tested in accordance with ASTM C157.

2.9 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

2.10 SOURCE QUALITY CONTROL

A. Comply with the requirements of Section 01410 - Quality Requirements

B. Batch Plant: Periodic Inspections of the source batch plant shall occur for the duration of concrete placement. Inspections shall occur during the following times, on each day that the concrete is being mixed for this project:

1. At time of plant startup.
2. During mixing of first five loads of concrete to be delivered to the site.
3. At least once more before the end of the day, during the mixing of five loads of concrete to be delivered to the site.

C. Aggregates: The Contractor shall supply the Owner's Testing Agency adequate samples of the aggregates to be used on the project. Sampling shall take place as discharged from the weight hopper or as close to the point of discharge into the mixer as possible. Sampling shall take place no more than two days prior to mixing concrete for the project. Sample and test at least once per 500 cubic yards of concrete placed.

D. The Owner's Testing Agency shall check all aggregates for general suitability, compliance with the specifications, and ASTM C33.

1. Sieve Analysis (ASTM C136)
2. Specific Gravity (ASTM C127 and C128)
3. Absorption (ASTM C127 and C128)
4. Moisture Content of Fine Aggregate (ASTM C70)
5. Cleanness Value (California Test 227)
6. Sand Equivalent (California Test 217)

E. Cement: Contractor shall supply the Owner's Testing Agency a certification that the cement has been manufactured and tested in accordance with ASTM C150. Where certification is not available, one grab sample shall be taken and tested for each day's pour. Sampling and testing shall be in accordance with the requirements of ASTM C183.

F. The Owner's Testing Agency will:

1. Review mix designs and certificates of compliance for materials submitted by the Contractor for review.

2. Inspect the batch plant to verify that the quality controls are adequate.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.

2. Use latex bonding agent only for non-load-bearing applications.

E. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends. Cover with sand to depth shown on drawings.

F. Roughen concrete surfaces in contact with new or existing concrete to 1/4 inch amplitude and clear of laitance, foreign matter and loose particles.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.4 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Repair underslab vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

E. Separate slabs on grade from vertical surfaces with joint filler unless otherwise indicated in the drawings.

F. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

G. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07 90 05 (07900) for finish joint sealer requirements.

H. Install joint devices in accordance with manufacturer's instructions.

I. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

J. Apply sealants in joint devices in accordance with Section 07 90 05 (07900).

K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

L. Place concrete continuously between predetermined expansion, control, and construction joints.

M. Do not interrupt successive placement; do not permit cold joints to occur.

N. Place floor slabs in pour strips and checkerboard or saw cut pattern as indicated.

O. Saw cut joints within 24 hours after placing. Use 1/8 inch thick blade, cut into 1/4 depth of slab thickness.

P. Screed floors level, maintaining the following minimum F(F) Floor Flatness and F(L) Floor Levelness values when measured in accordance with ASTM E 1155/ASTM E 1155M.

1. F(F): Specified Overall Value (SOV) of 35; Minimum Localized Value (MLV) of 24.

2. F(L): Specified Overall Value (SOV) of 25; Minimum Localized Value (MLV) of 17.

3.5 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:

1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and terrazzo with full bed setting system.

2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 301.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.

3. Other Surfaces to Be Left Exposed: "Steel trowel" as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

3.6 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than 7 days.

2. High early strength concrete: Not less than 4 days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:

1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
2. Slabs on Grade: Continuously moist cure concrete slabs on grade for seven days minimum. Water fog sprays, ponding, saturated absorptive covers, or moisture retaining covers may be used. Curing compounds are not acceptable.
3. Final Curing: Begin after initial curing but before surface is dry.
    a. Moisture-Retaining Cover: Seal in place with waterproof tape or adhesive.
    b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.7 MECHANICAL ANCHORS

A. Expansion, wedge, drop-in, shell and sleeve anchors shall conform with the requirements in the drawings.

3.8 ADHESIVE ANCHORS AND ADHESIVE DOWELS

A. Adhesive anchors and dowels shall conform with the requirements in the drawings.

3.9 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 (01400).

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to the owner's inspection and testing firm for review prior to commencement of concrete operations. Mix designs must include slump and compression test reports, and slab on grade concrete must include shrinkage test reports.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to the Owner's Representative within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Owner's Representative. The cost of additional testing shall be borne by when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Owner's Representative for each individual area.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Latest edition of American Concrete Institute, ACI 318 and Manual of Concrete Practice (inclusive of all Parts).

C. If conflict occurs between the Contract Drawings, the Project Manual, ACI 318, and the Manual of Concrete Practice, the most stringent takes precedence.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Sections:
   1. Division 03 Section "Architectural Concrete" for general building applications of specially finished and formed concrete.
   2. Division 03 Section "Specialty Placed Concrete" for pneumatically placed concrete.
   3. Division 03 Section "Post-Tensioned Concrete" for unbonded post-tensioned concrete.
   4. Division 03 Section "Site-Cast Concrete" for tilt-up concrete.
   5. Division 32 Section "Concrete Paving" for concrete pavement and walks.
   6. Division 32 Section "Decorative Concrete Paving" for decorative concrete pavement and walks.

1.3 DEFINITIONS

A. Architectural Concrete: Concrete that is exposed as an interior or exterior surface in the completed structure and is designated as architectural concrete in the Contract Documents; contributes to visual character of the completed structure and therefore requires special care in the selection of the concrete materials, forming, placing and finishing to obtain the desired architectural appearance.

B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

C. Reshores: Shores placed snugly under a stripped concrete slab or other structural member after the original forms and shores have been removed from a large area, requiring the new slab or structural member to deflect and support its own weight and existing construction loads to be applied before the installation of the reshores.

D. Shore: Vertical or inclined support members designed to carry the weight of formwork, concrete, and construction loads above.

E. Strength Test: The average of the strengths of at least two 6 by 12 inch cylinders or at least three 4 by 8 inch cylinders made from the same sample of concrete and tested at 28 days or at test age designated for determination of specified compressive strength of concrete.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amounts of mixing water to be withheld for later addition at Project site.
   2. Include qualified strength test records if design mixture is based on field experience.
   3. Include results of trial mixtures if design mixture is based on trial mixtures.
   4. Include results of modulus of elasticity tests on trial mixtures.
   5. Design mixture to be signed and sealed by a professional Civil or Structural Engineer licensed in the State in which the Project is constructed.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installers.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Waterstops.
   6. Curing compounds.
   7. Floor and slab treatments.
   8. Vapor retarders, including subbase materials.
   9. Bonding agents.
   10. Repair materials.
   11. Semirigid joint filler.
   12. Joint-filler strips.

D. Material Test Reports: For the following, from a qualified Testing Agency, indicating compliance with requirements:
   1. Aggregates.

E. ICC ES Evaluation Reports: For evidence of Building Code compliance:
   1. Mechanical splices and connectors for reinforcing steel.
   2. Slab punching shear resisting system.

F. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

G. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   1. Location of construction joints is subject to approval of the Architect.

H. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: Engage a qualified independent Testing Agency to perform material evaluation tests and to design concrete mixtures.

G. Preinstallation Conference: Conduct conference at Project site.
   1. Review special inspection and Testing Agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

E. Void Forms: Structurally sufficient to support weight of plastic concrete and other superimposed loads.
   1. Expanded polystyrene (EPS); ASTM C578, Type XI.

F. Chamfer Strips: Wood, metal, PVC, or rubber strips.

G. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

H. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615 Grade 60, deformed, UNO on drawings.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, Grade 60, deformed.

C. Plain-Steel Welded Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Dowel Bar Sleeves: Circular PVC sleeve, sealed one end, dowel bar embedment plus 1 inch in length, and 1/16 inch annular space inside diameter.

C. Deformed Bar Anchors: ASTM A1064/A1064M, deformed steel wire; AWS D1.1/D1.1M, Type C.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

E. Mechanical Splices and Connectors: Comply with ACI 318 and ACI 439.3R, Type I and Type II.
   1. Furnish splicing and connector system with current ICC ES Evaluation Report.

F. Punching Shear Reinforcing for Slabs: Comply with ACI 318 and ACI 421.1R.
   1. Furnish shear reinforcing system with current ICC ES Evaluation Report.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project.
   1. Portland Cement: ASTM C150/C150M, Type I or Type II. Supplement with the following:
      a. Fly Ash: ASTM C618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.
   1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal, unless noted otherwise on drawings.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C330/C330M, expanded shale, presize before firing, 3/4-inchnominal maximum aggregate size.

D. Water: ASTM C 94/C 94M.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C260/C260M .

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C494/C494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.

2.6 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
   1. Profile: Ribbed without center bulb.
   2. Dimensions: 6 inches by 3/8 inch thick (150 mm by 10 mm thick); nontapered.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E1745, Class A, 15 mil. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C33/C33M for fine aggregates.

2.8 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Aluminum Granule Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of not less than 95 percent fused aluminum-oxide granules.

B. Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, and plasticizing admixture.

2.9 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.10 CURING MATERIAL

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.

2.11 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D2240.

C. Reglets: Fabricate reglets in concrete to receive flashing from other trades of not less than 0.022-inch thick galvanized-steel sheet. See Division 07 Section “Sheet Metal Flashing and Trim”. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

D. Dovetail Anchor Slots: Provide as shown on Drawings. Hot-dip galvanized-steel sheet, not less than 0.034-inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.12 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C150/C150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
   2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
   4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
   1. Cement Binder: ASTM C150/C150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
   2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
   4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109/C109M.

C. Epoxy Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
   1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.13 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent Testing Agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Modulus of Elasticity: Modulus of elasticity tests (ASTM C469/C469M) shall be performed on laboratory trial mixtures for each concrete strength, each concrete mix design and for each aggregate source. Modulus of elasticity to be tested using servo controlled electromechanical United machines or servo controlled hydraulic Satec machines. Maintain rate of loading to 35 ± 4 psi in lieu of that specified in ASTM C469/C469M.

1. The modulus of elasticity (psi) at 28 days shall be a minimum of 100% of the target modulus of elasticity. Additional modulus of elasticity tests shall be performed on laboratory trial mixtures as follows:
   a. Concrete for Mild-Reinforced Slabs: The modulus of elasticity at 7 days or at time of formwork stripping, whichever comes first, shall be a minimum of 90% of the target modulus of elasticity.
   b. Concrete for Post-Tensioned Slabs: The modulus of elasticity at 3 days or at time of tendon stressing, whichever comes first, shall be a minimum of 85% of the target modulus of elasticity.
2. Target modulus of elasticity (psi):
   a. $57{,}000\ (f'_c)^{1/2}$, for $f'_c \le 5{,}000$ psi
   b. $40{,}000\ (f'_c)^{1/2} + 1 \times 10^6$, for $f'_c > 5{,}000$ psi
   c. f'_c is the specified concrete strength in psi at 28 days
3. A modulus of elasticity test shall be the average modulus of elasticity from a set of two (minimum) specimens obtained from same sample.
4. Use a qualified independent Testing Agency for preparing and reporting results of modulus of elasticity tests.

C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash: 25 percent maximum
      a. Fly ash is not permitted in suspended slabs.

D. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

E. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use water-reducing admixture in pumped concrete, concrete for parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117, unless specified otherwise in the Contract Documents.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete, unless otherwise indicated on Drawings.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 12 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with latest editions of ACI 318, ACI 301, and ACI 347.2R for design, installation, and removal of shoring and reshoring.
   1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, the design of shoring and reshoring systems shall be based on the expected early age concrete strength and stiffness (modulus of elasticity) at the time shoring and reshoring is implemented.
   1. For mild-reinforced slabs, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
   2. For post-tensioned slabs, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded. Maximum induced tensile stress shall be limited to 6 $(f'_{ce})^{1/2}$, where f'_{ce} is the expected early age strength of concrete at the time of stripping and reshoring.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.
   1. The age at which removal of shores and reshores can be implemented, and the number of levels reshoring is needed, largely depend on the early age concrete strength and stiffness (modulus of elasticity).
   2. The shoring and reshoring design calculations shall explicitly indicate both the maximum anticipated stress as well as the maximum anticipated deflection of the all impacted slabs (active slab plus supporting slabs).
      a. Immediately after placement of concrete on the active slab.
      b. At the time of formwork stripping and reshoring.
      c. At the time all reshored have been removed.

3.5 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E1643 and manufacturer's written instructions.
   1. Lap joints 6 inches and seal with manufacturer's recommended tape.

B. Granular Course: **[Cover vapor retarder with][Place vapor retarder over]**4-inch bed of granular fill, material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.
   1. Fine-Graded Granular Material: Place and compact a 1/2-inch layer of fine-graded granular material over granular fill.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
   1. Weld reinforcing bars according to AWS D1.4/D1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
   2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   5. If not indicated, space vertical joints in walls at 25 feet intervals and 15 feet from corners. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
      a. Perform saw-cutting before concrete starts to cool, as soon as the concrete surface is firm enough not to be torn or damaged by the blade, and before random drying-shrinkage cracks can from in the concrete slab. Joints produced by conventional dry- or wet-cut process shall be made within 4 hours in hot weather and within 12 hours in cold weather after the slab has been finished.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
   2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint or use PVC dowel bar sleeve.

3.8 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   2. Maintain reinforcement in position on chairs during concrete placement.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Deviation from cross sectional thickness of suspended slabs shall not exceed ±1/4”.
   5. Deviation from elevation of suspended slabs before removal of supporting shores shall not exceed +3/8” nor -1/4”.
   6. Slope surfaces uniformly to drains where required.
   7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and 305R and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
   1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
   1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
   1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, or built-up or membrane roofing.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
   2. Finish surfaces to the following tolerances, according to ASTM E1155, for a randomly trafficked floor surface:

a. Specified overall values (SOV) of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values (MLV) of flatness, F(F) 17; and of levelness, F(L) 15.

b. Specified overall values (SOV) of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values (MLV) of flatness, F(F) 24; and of levelness, F(L) 17; for surfaces to receive thin-set flooring.

3. For floor installations 10,000 sq. ft. or less in total project area, finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (90 percent compliance) in accordance to ACI 117 Section 4.8.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
   1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
   1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
   1. Uniformly spread 25 lbs./100 sq. ft. of dampened slip-resistive aluminum granules over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
   2. After broadcasting and tamping, apply float finish.
   3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
   1. Uniformly apply dry-shake floor hardener at a rate of 100 lbs./100 sq. ft. unless greater amount is recommended by manufacturer.
   2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
   3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.13 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306R for cold-weather protection and ACI 305R for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
      c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
      a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.14 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
   1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
   2. Do not apply liquid to concrete sooner than that recommended by manufacturer.
   3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.15 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.16 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
   2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
   3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
   4. Repair technique shall be tested on a mockup or surface to be concealed later, before repairing surfaces exposed to view, for approval by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
   1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
   2. After concrete has cured at least 14 days, correct high areas by grinding.
   3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
   4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
   5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified Testing Agency to perform field tests and inspections and prepare test reports.

B. Inspections: Verify and inspect concrete Work as shown on Drawings.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one random composite sample for each 150 cu. yd. of concrete or 5,000 sq. ft. of surface area of slabs of walls, or fraction thereof, of each concrete mixture placed each day.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M, pressure method, for normal-weight concrete; ASTM C173/C173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C567/C567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C31/C31M.
   a. Mild-Reinforced and Post-Tensioned Slabs and Beams: Cast and laboratory-cure four standard cylinder plus one spare standard cylinder specimens for each composite sample.
      1) Cast and field-cure additional standard cylinder specimens to verify concrete strength for removal of shoring and reshoring in multistory construction. Number of field-cured cylinder specimens to be determined by Contractor.

2) Cast and field-cure additional standard cylinder specimens to verify concrete strength for stressing of tendons in post-tensioned construction. Number of field-cured cylinder specimens to be determined by Contractor.

b. Shear Walls and Columns: Cast and laboratory-cure five standard cylinder plus one spare standard cylinder specimens for each composite sample.

c. Other Concrete Elements: Cast and laboratory-cure four standard cylinder plus one spare standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C39/C39M.
   a. Mild-Reinforced Concrete Slabs: Test one laboratory-cured specimen at 4 days and one laboratory-cured specimen at 7 days or upon formwork stripping, whichever comes first; and two laboratory-cured specimens at 28 days.
   b. Post-Tensioned Concrete: Test one laboratory-cured specimen at age determined by contractor, and one laboratory-cured specimen at 7 days; and two laboratory-cured specimens at 28 days.
   c. Shear Walls and Columns: Test one laboratory-cured specimen at 7 days, one laboratory-cured specimen at 56 days and one laboratory-cured specimen at 90 days; and two laboratory-cured specimens at 28 days.
   d. Other Concrete Elements: Test two laboratory-cured specimens at 7 days and two laboratory-cured specimens at 28 days.
   e. A compressive-strength test at shall be the average compressive strength from a set of two specimens obtained from same composite and tested at the age indicated.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
   a. If 28-day compressive-strength test falls below satisfactory levels, strength test the spare cylinder at age determined by the Contractor and average with the strength of the 28-day specimens. The average strength of the three cylinders shall be considered one compressive-strength test.
9. Modulus of Elasticity Test Specimens: ASTM C31/C31M.
   a. Mild-Reinforced and Post-Tensioned Slabs and Beams: Cast and field-cure ten standard cylinder specimens plus two spares for each composite sample.
      1) Composite samples (consisting of 12 standard field-cured cylinder specimens) for each concrete strength, each concrete mix design and for each aggregate source, shall be randomly selected from every five floors, with two random composite samples minimum per building.
   b. Shear walls and columns: Cast and field-cure eight two standard cylinder specimens plus two spares for each composite sample.
      1) Composite samples (consisting of 10 standard field-cured cylinder specimens) for each concrete strength, each concrete mix design and for each aggregate source, shall be randomly selected from every five floors, with two random composite samples minimum per building.
10. Modulus of Elasticity Tests: ASTM C469/C469M. Modulus of elasticity to be tested using servo controlled electromechanical United machines or servo controlled hydraulic Satec machines. Maintain rate of loading to 35 ± 4 psi in lieu of that specified in ASTM C469/C469M.
    a. Mild-Reinforced and Post-Tensioned Slabs and Beams: Test two field-cured specimens at 2 days, 4 days, 7 days, 14 days, and 28 days.
    b. Columns and Shear Walls: Test two field-cured specimens at 7 days, 28 days, 56 days, and 90 days.
    c. A modulus of elasticity test shall be the average modulus of elasticity from a set of two specimens obtained from same composite sample and tested at age indicated.

d. If modulus of elasticity of two specimens varies by more than 15% a spare cylinder shall be tested. The average modulus of elasticity of three specimens shall be considered the modulus of elasticity.

e. Modulus of elasticity tests are required for each concrete strength, each concrete mix design and for each aggregate source.

11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing.

    a. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete Testing Agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for each age tested.

    b. Reports of modulus of elasticity tests shall contain Project identification name and number, mix identification number, specimen identification number, curing and environmental history of specimen, date of test, name of Testing Agency, and plot of the results with age of concrete as the abscissa and modulus of elasticity as the ordinate..

12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E1155 within 24 hours of finishing.

3.18 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 033500

CONCRETE SEALERS AND STAINS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 031000 - Concrete Forming and Accessories: Surface retarders for exposed aggregate finish.
   2. Section 033000 - Cast-in-Place Concrete.
   3. Section 321313 - Concrete Paving, curbs, and Gutters.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Sealers must not exceed the VOC and chemical component limits of South Coast Air Quality Management District Rule #1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data, including chemical properties and percentage of solids, for each product.

C. Samples:
   1. Submit one 12 inch by 18 inch concrete sample for each sealer and stain color specified.
   2. Coat one-half of each sample with finish and leave one-half untreated.

D. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Applicator's qualification data.
   3. Manufacturer's Instructions: Application instructions, including surface preparation and application rates for each type of substrate, methods, and techniques.

1.3 QUALITY ASSURANCE

A. Applicator's Qualifications: Company specializing in performing work of this Section with 3 years minimum experience.

B. Certifications:
   1. Submit manufacturer's certificate stating proper amount of materials was ordered and shipped to Project.
   2. Submit sealer manufacturer's certificate indicating review of Project conditions and intent to issue extended warranty. Submittal of certificate is required prior to application of materials.

1.4 FIELD SAMPLES

A. General: Comply with provisions of Section 014500.

B. Cast and finish three 4 foot by 4 foot sample panels with dry shake hardener finish for Architect's review of color consistency and workmanship. Provide workmanship and procedures necessary to match Architect approved submittal.

C. Maintain accepted sample application during construction as standard for Work.

D. Architect's Review:
   1. Architect will review field sample for visual acceptance of materials and workmanship.
   2. Replace unsatisfactory Work as directed by Architect.

E. Approved samples may [not] remain as part of the Work.

1.5 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Arrange for manufacturer's technical representative to be on Project site to advise applicator of proper procedures and precautions and to observe application methods of products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Store products above 50 degrees F, but no greater than 85 degrees F, unless otherwise recommended by manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when ambient or substrate surface temperatures are below 40 degrees F or higher than 100 degrees F.

B. Do not apply during inclement weather or when forecasted conditions will not permit compliance with manufacturer's printed instructions.

C. Provide mechanical ventilation during and after application to dissipate fumes if natural ventilation is insufficient.

1.8 SCHEDULING

A. Schedule application of products at proper time intervals after concrete finishing and curing operations.

B. Maintain proper moisture content of concrete before, during, and after application of specified products.

1.9 WARRANTY

A. Comply with provisions of Section 017800.

B. Warrant applied sealer system to be free of defects related to material deficiency and workmanship for 5 years.

C. Warranty period begins at date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials, equipment, and personnel required to achieve specified finish.

B. Water Based Acrylic Sealing Compounds:
   1. ASTM C1315, Type I, Class A, VOC compliant, free of natural or petroleum waxes. Dries clear with satin sheen.
   2. Compatible with subsequent coatings and toppings.
   3. VOC Requirement: Less than 100 g/L
   4. Acceptable Products:
      a. Lumiseal WB Plus, L&M Construction Chemicals, Inc.
      b. VOCOMP-30, W. R. Meadows.
      c. MonoChem AquaSeal W20, Monopole.
      d. MonoChem PermaSeal, Monopole.
   5. Sealers: Only use sealers in the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
      a. Current requirement refers to the date on which the materials are installed in the building.
      b. SCAQMD Rule #1113 is current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

2.2 CONCRETE STAIN

A. Acid Stain: Acidic, water-based, metallic salt solution which chemically reacts with concrete to produce insoluble color deposits.
   1. Colorants: Metallic salts. No pigments, dyes, or resins permitted.
   2. Color:
   3. Sealer: Clear urethane.

4. Acceptable Products and Manufacturers:
   a. Mirastain 1 with Mirathane APU Sealer, Miracote Division, Crossfield Products.
   b. ChemTone Acid Stain with Polybright WB Concrete Sealer, Decorative Concrete Supply (Decosup), Inc.
   c. Lithochrome Chemstain with Cementone Sealer, L M Scofield Co.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that damage and defects in concrete surface have been repaired as specified in Section 033000 and accepted by Architect.

C. Verify that surfaces are clean, dry, dust free, and free of efflorescence, oil or other matter detrimental to sealer application.

D. Verify that joint sealant work in adjoining surfaces is complete prior to applications of sealers. Delay application until sealants have cured.

E. Ensure concrete has cured for time period required by manufacturer of product to be applied 28 days minimum before application of products.

3.2 PREPARATION

A. Provide protection as necessary to protect adjacent materials and surfaces from dirt, dust, and other surface or physical damage.

B. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containment devices.

C. Maintain control of concrete chips, dust and debris. Collect water to prevent damage to adjacent surfaces.

D. Remove loose particles, foreign matter, and oil by method which will not affect sealer application.

E. Prepare surfaces in accordance with manufacturer's directions.

3.3 APPLICATION

A. General:
   1. Provide finishes to match approved samples at locations indicated.
   2. Apply materials in accordance with manufacturer's printed instructions.

B. Liquid Membrane-Forming Sealer and Hardeners:
   1. Apply sealer using low pressure airless sprayer in single coat at 400 to 600 ft/gal coverage unless greater amount is recommended by manufacturer to obtain penetration and full coverage.
   2. Do not allow flooding or puddling of material on surface.
   3. Do not dilute or alter material as packaged.
   4. Sealer Locations: Exposed concrete of janitor’s closets, electrical and telephone rooms, storage rooms, service elevator lobbies, and other scheduled areas.
   5. Hardener Locations: Exposed concrete floor for service, vehicular, and forklift areas.

C. Penetrating Concrete Stain:
   1. Apply stain in number of coats and at rate indicated by manufacturer to obtain penetration and full coverage.
   2. Do not allow flooding of surface or multi-coat overlapping.
   3. Do not dilute or alter material as packaged.
   4. Provide tint and opacity to match sample.
   5. Apply sealer over stained concrete surface.

3.4 ADJUSTING

A. Repair or replace adjacent Work which has been damaged by finishing operations.

3.5 CLEANING

A. Clean-up and remove debris daily.

B. Clean spillage, overspray, or drift from adjacent surfaces; remove immediately in accordance with manufacturer's instructions.

3.6 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect finished concrete surfaces from damage by construction equipment, operations and from adverse weather conditions.

3.7 SCHEDULE

A. Locations:
   1. Sealers: Exposed concrete in Mechanical and Electrical Rooms and all other areas scheduled for sealed concrete floors.
   2. Concrete Stain: Location as directed by Architect.

END OF SECTION

SECTION 033713

SHOTCRETE

(LANDMARK BUILDING)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pneumatically applied concrete.

1.2 RELATED SECTIONS

A. Section 03 10 00 - Concrete Forming and Accessories: Prepared forms to achieve configuration, contours, and tolerances required.

B. Section 03 20 00 - Concrete Reinforcing.

C. Section 03 30 00 – Cast-In-Place Concrete

1.3 REFERENCES

A. ACI 506.2 - Specification for Materials, Proportioning, and Application of Shotcrete; American Concrete Institute International; 1995.

B. ASTM A 185/A 185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2006.

C. ASTM A 497/A 497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2006.

D. ASTM C 33 - Standard Specification for Concrete Aggregates; 2003.

E. ASTM C 150 - Standard Specification for Portland Cement; 2005.

F. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2006.

G. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2005a.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on admixtures.

C. Shop Drawings: Indicate formwork, dimensions, reinforcement, accessories.

D. Mix design test reports.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 506.2.

1. Maintain one copy of document on site.

2. The word "shall" shall be substituted whenever the word "should" occurs in ACI 506.2.

B. Applicator Qualifications: Company specializing in performing shotcrete installations, with minimum 5 years of documented experience.

1.6 MOCK-UP

A. Sample Panel: Construct two panels, 4 feet long by 4 feet wide, to indicate range of special treatment or finish required.

B. Test Panels: Prior to starting work provide mock-up for evaluation of materials and workmanship:

1. Test Panels shall be 4 feet long by 4 feet wide.
2. Provide three test panels fabricated by placing shotcrete onto plywood for each mix design being considered, and for each shooting position to be encountered.
3. Form panels to identical shotcrete thickness with reinforcement in place.
4. After shooting, but before the concrete has fully set, the testing agency shall disassemble the panels to assure that the team and equipment to be used is capable of providing sound shotcrete, free of voids, sags, segregation, honeycombing, lamination, dry patches slugs and similar defects.
5. Application of shotcrete in the Work shall not proceed until the test panels have been disassembled, inspected and approved.

1.7 PROJECT CONDITIONS

A. Coordinate the Work with associated items that are placed within shotcrete work.

B. Coordinate with associated or adjacent materials.

1.8 FIELD CONDITIONS

A. Suspend shotcrete operations during high winds, rainy weather, or near freezing temperatures when work cannot be protected.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cement: ASTM C 150, Type V - Sulfate resistant; grey color.

B. Aggregate: Normal weight, ASTM C 33, 1/2 inch maximum size.

C. Admixtures: Chemical type conforming to ASTM C 494/C 494M (wet mix only).

D. Air-Entraining Admixture: Conforming to ASTM C 260 (wet mix only).

E. Reinforcing Bars: Type and size as indicated on drawings.

F. Water: Clean, potable, and not detrimental to shotcrete.

G. Curing Compound: Type not detrimental to application of subsequent surface finish materials.

H. Bonding Agent: Compatible with substrate and subsequent materials.

2.2 SHOTCRETE MIX

A. Provide wet or dry mix design that gives good compaction and low percentage of rebound, is stiff enough not to sag.

B. Conform to following requirements:

1. Compressive Strength (28 day minimum): As indicated on drawings.
2. Aggregate Size (maximum): 1/2 inch.
3. Slump (plus or minus 1/2 inch): 2 1/2 inch.

C. Maintain quality control records during production of shotcrete; make records available.

2.3 EQUIPMENT

A. Mixing Equipment: Capable of thoroughly mixing dry aggregate and cement in sufficient quantity to maintain continuous placement.

B. Delivery Equipment:

1. Air Supply: Clean, dry air adequate for maintaining sufficient nozzle velocity, uniformly steady for work while simultaneously operating blow pipe for cleaning away rebound.

2. Capable of loading aggregate and cement mixture into delivery hose under full control while maintaining continuous stream of uniformly mixed material at required velocity to discharge nozzle.

3. Equip discharge nozzle with water injection system (water ring) for directing even distribution of water to aggregate and cement mixture.

C. Water Supply: Uniform water pressure at discharge nozzle sufficiently greater than operating air pressure to ensure intimate mixing with aggregate-cement mix; provide water pump to system if line water pressure is inadequate.

2.4 SOURCE QUALITY CONTROL AND TESTS

A. An independent testing agency will provide inspection and testing services, as specified in Section 01 40 00.

B. Prior to start of work, testing agency will review mix proportions, gradation, and quality of aggregate.

C. Test samples in accordance with ACI 506.2.

D. Independent testing agency will test mock-up panels as follows:

1. Drill 3 inch diameter core samples from test panels.

2. Test for strength.

E. Modify mix design as required based on results of testing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that conditions are acceptable and are ready to receive work.

C. Verify that field measurements are as shown on drawings.

D. Verify fabricated forms are:

1. True to line and dimension.

2. Adequately braced against vibration during placement.

3. Constructed to permit escape of trapped air during gunning operations.

4. Constructed to minimize rebound during gunning operations.

E. Verify correct placement of reinforcement with sufficient clearances to permit complete encasement.

F. Ensure easy access to shotcrete surfaces for screeding and finishing, and to permit uninterrupted application.

3.2 PREPARATION

A. Determine operating procedures for placement in close quarters, extended distances, or around unusual obstructions where placement velocities and mix consistency may be adjusted during application.

B. Clean and wet cementitious or absorptive substrate surfaces prior to receiving shotcrete. Keep porous surfaces damp for several hours prior to placement of shotcrete.

C. Protect adjacent surfaces not receiving shotcrete.

3.3 ALIGNMENT CONTROL

A. Provide alignment wire to establish thickness and plane of required surfaces.

3.4 APPLICATION

A. Place reinforcement in accordance with ACI 506.2.

B. Use mixing and delivery equipment capable of thoroughly mixing aggregate, cement, and water in sufficient quantity to maintain continuous and uniform placement.

C. Do not apply shotcrete more than 45 minutes after adding Portland cement to the mix.

D. Do not place shotcrete on surfaces that are frozen, spongy, or where there is free water.

E. Achieve maximum compaction with minimum rebound.

F. Build-up to required thickness in multiple passes to achieve layering. Encase reinforcement with the first pass.

G. Allow each layer to take initial set before applying succeeding layers.

H. Do not permit applied shotcrete to sag, slough, or displace.

I. After initial set of final layer, remove excess material outside of forms and alignment lines.

J. Sandblast to remove laitance. Clean with air/water pressure jet.

K. Finish surface of final layer with uniform finish, as demonstrated on sample panel approved in advance by the Architect, and to a tolerance of no more than 1/4-inch in 10 feet, non-cumulative.

L. Remove rebound at construction and expansion joints.

M. Remove rebound material that does not fall clear of work; discard salvaged rebound.

N. Maintain shotcrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of shotcrete.

O. Immediately after placement, protect shotcrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

P. Maintain surfaces wet for a minimum of 7 days.

Q. Sound test the applied material with hammer for voids. Expose voids and replace with new shotcrete ensuring full bond with adjacent work.

3.5 FIELD QUALITY CONTROL

A. Provide additional test panels, as specified for mock-up, during the course of the work as may be requested by the testing agency.

B. Completed shotcrete shall be checked visually for reinforcing bar embedment, voids, rock pockets, sand streaks, and similar deficiencies by examining a minimum of three 3" cores of each mix of shotcrete used each day. Cores shall be taken at a rate of one core for each 1,000 square feet of wall area and a minimum of 2 cores for each day's application by any one application crew. Cores shall be taken from areas chose by the special inspector. The cores shall be examined by the special inspector, and a report shall be submitted to the enforcement agency prior to final approval of the shotcrete.

3.6 PROTECTION

A. Do not permit applied work to damage adjacent surfaces.

END OF SECTION

SECTION 033713

SHOTCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparation of surfaces to receive shotcrete.
   2. Forms and ground wires.
   3. Mixing, delivery, placing, finishing, and curing of shotcrete.
   4. Protection and cleaning of adjacent surfaces.
   5. Furnishing and placing reinforcing steel.

B. Related Work Specified Elsewhere:
   1. Section 033000, “Cast-in-Place Concrete.”
   2. Section 030500, “Crystalline Waterproofing.”

1.2 SUBMITTALS:

A. Comply with pertinent provisions of Division 01.

B. Shop Drawings: For details of fabricating, bending, and placing reinforcement. Include support and anchor details, number and location of splices, and special reinforcement required for openings through shortcrete structures.

C. Product Data: Submit the following:
   1. Mill certificates for Portland cement.
   2. Certification and testing results for aggregates.
   3. Manufacturers data and certification of compliance for all admixtures.
   4. Manufacturers data and certificates for all products including but not limited to curing materials, bonding agents, etc.

D. Mix Designs: Submit mix designs for each concrete mix. Concrete mix design shall include all admixtures, shrinkage data and shall be stamped and signed by a licensed Civil Engineer registered in the State of California.

E. Pre-Construction Test Panel Shop Drawings: Indicate dimensions, thickness, reinforcement, inserts, accessories and location.

F. Placement Schedule: Indicate schedule of placement and construction joints.

G. Certificates of Compliance:
   1. Cement per CBC, 1910.2.
   2. Aggregates.
   3. Admixtures.

H. Nozzleman Qualifications:
   1. ACI Certification.
   2. Documentation of experience.

I. Test results of shotcrete pre-construction test panels.

1.3 QUALITY:

A. Comply with all pertinent provisions of Division 01. Conform to CBC 1910 unless more stringent requirements are included in the specifications or drawings.

B. Minimum compressive strength shall be 4,000 pounds per square inch. Furnish mill certificates for cement used.

C. Pre-construction tests shall be shot, cured cored or sawn, examined and tested prior to commencement of the project. The sample panel shall be representative of the project and simulate job conditions as closely as possible. The panel thickness and reinforcing shall reproduce the thickest and most congested area specified in the structural design. It shall be shot at the same angle, using the same nozzleman and with the same concrete mix design that will be used on the project. The sample panel shall be a minimum of 4 feet wide and 6 feet high. A mean test panel core grade equal to or less than 2.0 in accordance with ACI 506.2 grading is required for each nozzleman.

D. Installer Qualifications: A qualified installer employing nozzle operators who attain mean core grades not exceeding 2.5, according to ACI 506.2, on pre-construction tests.

E. Testing Agency Qualifications: Independent and qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548, and acceptable to authorities having jurisdiction.

1.4 PRECONSTRUCTION MOCK-UP TEST:

A. Wall Test Panels: Construct mock-up for evaluation of proposed materials, equipment and workmanship:
   1. Provide one 5 feet by 5 feet vertical mock-up panel fabricated by placing shotcrete onto plywood form for each proposed nozzleman and for each mix design being considered.
   2. Prepare panels using the same equipment to be used in the project and the anticipated shooting orientation and distance from the application.
   3. Form and reinforce panels to replicate the most congested wall on the project. Include bar bends, foundation and wall dowels, and additional vertical and horizontal bars, column ties, embed items and other conditions.
   4. Finish each panel with finish to be used on the project.
   5. Use the same equipment to be used for the main work.
   6. Cure panel in the same manner that the main work with be cured.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Portland cement: ASTM C150, Type II. Use material of only one manufacturer throughout the work.

B. Water: Shall be from potable source.

C. Admixtures: Chemical type conforming to ASTM C494 and ASTM C1141 (wet-mix only).

D. Crystalline Admixture: Provide concrete waterproofing admixture at perimeter basement walls conforming to Section 030500, “Crystalline Waterproofing.”

E. Reinforcing steel: Conform to Section 03-03200, “Concrete Reinforcement”.

F. Fine aggregates: Conform to ASTM C33 and, in addition, the moisture content of sand shall not exceed 4% and shall be well graded in size within the following limits.

Sieve size, U.S. Standard Square Mesh	Percent Passing by Weight
3/8"	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 65
No. 50	10 - 30
No. 100	2 - 10

G. Coarse aggregate, except as otherwise specified, shall be uniformly graded from materials 100% passing a 3/4" screen to 100% retention to a #4 mesh screen.

H. Electrodes: AWS D5.1, 80 or 90 Series as required for intended use.

I. Epoxy crack repair system: Sika Chemical "Sikadur Hi-Mod" with Sikastix 370 for sealing cracks, or equal.

J. Curing Compound: ASTM C309 type not detrimental to application of subsequent surface finish material.

K. Fly Ash: ASTM C618, Type C or Type F.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES:

A. Thoroughly clean and roughen surfaces to receive shotcrete by sandblasting, mechanical cleaning, and other approved methods in accordance with structural general notes. Dampen concrete or earth to receive shotcrete. Existing concrete surfaces to receive shotcrete shall be roughened to 1/4” minimum amplitude.

3.2 REINFORCING STEEL PLACEMENT :

A. Reinforcing steel shall be accurately placed and set in strict accordance with the drawings and the notes therein, and shall be supported and secured in place in such a manner that vibration resulting from depositing gunite or shotcrete will not injure the work. Unless noted otherwise, all reinforcement lap splices shall be non-contact. Reinforcement shall be cleaned of any rust, loose mill scale, grease, and hardened or semi-hardened gunite before placing gunite.

3.3 PROTECTION:

A. Protect adjacent surfaces from damage during shotcreting operations, and repair all damage that occurs.

3.4 FORMS:

A. Erect rigid forms that produce smooth plane surfaces, made of plywood, steel, or other equivalent material as approved. Forms shall be built to permit escape of air and rebound. Forms shall be oiled or dampened and shall be cleaned just prior to applying shotcrete.

3.5 GROUND WIRES:

A. Install ground wires in adequate number to establish thickness, surface planes, and finish lines of the shotcrete. Maintain tolerances by keeping ground wires secure and tight. All surfaces shall be rodded to these wires.

3.6 EMBEDDED ITEMS:

A. Coordinate with work of other sections to be sure that all items to be embedded in shotcrete are installed, properly located, and rigidly secured in place.

3.7 SHOTCRETING:

A. Conform to the provisions of ACI 506 and ACI 506.2, unless otherwise specified. Nozzle-men shall be ACI 506.3R certified in the type of shotcrete application required on the job. Compressors shall be "oil free" or provided with dry type compressed air filter on the outlet line. Air filters shall be 99 percent efficient in removing oil and solid particles at 0.3 micron rating. Provide the filter with baked enamel finished steel housing and manual drain valve.

3.8 BATCHING AND MIXING SHOTCRETE:

A. Mix proportions shall be controlled by weight batching. Aggregate gradations that contain aggregates larger than 1/2-inch in diameter shall have the fine and coarse aggregates batched separately. Do not use rebound or previously expended material in the mix. Scales shall conform to U.S. Department of Commerce, NBS handbook No. 44 and be accurate to plus or minus 2 percent.

3.9 SHOTCRETE PLACEMENT:

A. Delivery Equipment: Provide on both the air and water hose ANSI B40.1 pressure gages, approximate scale diameter of 3.5 inches, with a gage pressure range not exceeding 50 percent of maximum operating pressure.

B. Air Supply: Provide a uniform, steady supply of clean, dry air to maintain sufficient nozzle velocity with simultaneous operation of a blow pipe and air/water gun. Provide minimum ACI 506 compressor capacities.

C. Wet Mix: Delivery equipment shall discharge the shotcrete mixture accurately, uniformly, and continuously through the delivery hose.

D. Placement Technique: Whenever possible, except when enclosing reinforcing steel, the nozzle shall be held at right angles to the surface to be shotcreted and at a distance from 2 ½ to 3 feet. When enclosing reinforcing steel, the nozzle shall be held so as to direct the material behind the bars. Each side of each bar shall be shot separately. Any deposits of loose sand or rebound shall be carefully removed from surfaces before shotcreting. A second experienced nozzleman equipped with an air jet shall attend the operators whenever reinforcing steel is being enclosed and shall carefully precede the nozzle and blow out all rebound and sand which may be lodged behind the steel. Horizontal members shall not be shot from the top unless special methods satisfactory to the enforcement agency are specified to eliminate rebound. Dry-mixed onsite shotcrete shall be placed within 45 minutes after cement and sand are mixed. Wet-mixed shotcrete shall be placed within 90 minutes after initial mixing. Shotcrete shall not be placed where the stream from the nozzle cannot directly impinge on the surface on which the shotcrete is to be placed. Where shooting conditions are difficult, the proper results shall be obtained by maintaining normal air pressure and water ratio and materially reducing the supply of material.

E. Placement Priority: Fill all corners, and other areas where rebound cannot escape or be blown free, with sound material first.

F. Placement Around Reinforcement: Hold the nozzle closer to the work and at a slight angle from the perpendicular to ensure the shotcrete washes behind reinforcement before shotcrete accumulates on front of the reinforcement. In the dry mix process, add additional water to the mix to provide a smooth flow of material behind the bars. Do not place shotcrete through more than one layer of reinforcing steel in one application, unless otherwise approved.

3.10 REBOUND:

A. Rebound shall not be used in the work. Remove from site.

3.11 PUDDLED SHOTCRETE:

A. Puddled shotcrete shall not be used.

3.12 CONSTRUCTION JOINTS:

A. Except where shown on the drawings, unfinished work shall not be allowed to stand for more than 30 minutes unless all edges are sloped to a thin edge. Before placing additional material adjacent to previously applied work, sloping and square edges shall be cleaned and wetted. The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or sand blasting and roughened to ¼" minimum amplitude. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.

3.13 FINISHING:

A. Rod surfaces to true lines, and remove ground wires; rubber-float the surfaces.

3.14 CURING:

A. During the curing periods specified herein, shotcrete shall be maintained above 40º F and in moist condition. In initial curing, shotcrete shall be kept continuously moist for 24 hours after placement is complete. Final curing shall continue for seven days after shotcreting, for three days if high-early-strength cement is used, or until the specified strength is obtained. Final curing shall consist of a fog spray or an, approved moisture-retaining cover or membrane. In sections of a depth in excess of 12 inches, final curing shall be the same as that for initial curing.

3.15 CRACK REPAIR:

A. Repair cracks more than 1/16" wide. Cut cracks out 6-inches, slope bevel and dampen the cut edges. Repair with new shotcrete cured and finished to match adjoining surfaces. In lieu thereof, cracks may be repaired with epoxy pressure grouting system using epoxy crack sealer, nipples and pressure epoxy injection. Conform to epoxy system manufacturer's instructions. Remove nipples and fittings, and fill holes with epoxy. Finish repairs flush with adjoining surface. Delay crack repair as long as possible and perform just prior to final completion of the work.

3.16 TESTING:

A. Strength Test: Strength test for shotcrete shall be made in accordance with ASTM standards by an approved agency on specimens which are representative of work and which have been water soaked for at least 24 hours prior to testing. When the maximum size aggregate is larger than 3/8 inch, specimens shall consist of not less than three 3-inch-diameter cores or 3-inch cubes. When the maximum size aggregate is 3/8 inch or smaller, specimens shall consist of not less than three 2-inch-diameter cores or 2-inch cubes. Specimens shall be taken in accordance with one of the following:
   1. From the in-place work: taken at least once each shift or less than one for each 50 cubic yards of shotcrete; or
   2. From test panels: made not less than once each shift or not less than one for each 50 cubic yards of shotcrete placed. When the maximum size aggregate is larger than 3/8 inch, the test panels shall have a minimum dimension of 18 inches by 18 inches. When the maximum size aggregate is 3/8m inch or smaller, the test panels shall have a minimum dimension of 12 inches by 12 inches. Panels shall be gunned in the same position as the work, during the course of the work and by nozzlemen doing the work. The conditions under which the panels are cured shall be the same as specified in Section 3.14. Approval from the enforcement agency must be obtained prior to performing the test panel method.

B. If tests show deficiencies in strengths additional cores shall be taken and tested, and/or mixes shall be adjusted or other measures taken to assure proper results, as directed by Agency's Representative.

C. Repair shotcrete work to match existing when coring is done. Work in place and all necessary repairs pertaining thereto, shall be paid by Design Builder.

3.17 INSPECTION:

A. Continuous inspection shall be provided by a special inspector, approved by OSHPD, for batching, mixing and placing of shotcrete. Shotcrete work shall be inspected in accordance with CBC, CCR, Section 1924.11.

B. Visual examination for structural soundness of in-place shotcrete. Completed shotcrete work shall be checked visually for reinforcing bar embedment, voids, rock pockets, sand streaks and similar deficiencies by examining a minimum of three 3-inch cores taken from three areas chosen by the Agency's Representative which represent the worst congestion of reinforcing bars occurring in the project. Extra reinforcing bars may be added to non-congested areas and cores may be taken from these areas. The cores shall be examined by the special inspector and a report submitted to the enforcement agency prior to final approval of the shotcrete.

EXCEPTION: Shotcrete work fully supported on earth, minor repairs, and when, in the opinion of the enforcement agency, no special hazard exists.

3.18 CLEANUP:

A. During the process of the work, the premises shall be kept reasonably free of all debris, and waste materials resulting from the work under this Section. All such debris and rubbish shall be removed from the site.

END OF SECTION

SECTION 033816

UNBONDED POST-TENSIONED CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Post-tensioning reinforcement and accessories including prestressing tendons, pocket formers, support bars, bar chairs, and slab bolsters.
   2. Post-tensioning operations including stressing, recording tendon elongations and gage pressures, and finishing tendons.

B. Related Sections:
   1. Division 03 Section "Cast-In-Place Concrete" for general building applications of cast-in-place concrete.

1.3 DEFINITIONS

A. Aggressive Environment: An environment in which structures are exposed to direct or indirect application of deicing chemicals, seawater, brackish water, or spray from these water sources; and salt-laden air as occurs in the vicinity of seacoasts. Aggressive environments also include structures where stressing pockets are wetted or are directly in contact with soils.

B. Coupler: A device designed to connect ends of two strands together, thereby transferring the prestressing force form end to end of the tendon. Device includes a protective sleeve of adequate length to permit coupler movement during stressing. Couplers are used to repair broken strands.

C. Encapsulated Tendon: A tendon that is completely enclosed in a watertight covering from end to end, including a protective cap over the tendon tail at each end.

D. Non-Aggressive Environment: All environments not specifically defined herein as aggressive, including enclosed buildings.

E. Strand Tail: Excess strand length extending past the anchorage device.

F. Stressing Pocket: Void formed by pocket former at stressing-end anchorage to provide required cover over wedges and strand tail.

G. Tendon: A complete assembly consisting of anchorages, prestressing steel, post-tensioning coating and sheathing.

H. Wedge Cavity: Cone-shaped hole in anchorage device designed to hold the wedges that anchor the strand.

1.4 COORDINATION

A. Attachments and Penetrations:
   1. Attach permanent construction such as curtain-wall systems, handrails, fire-protection equipment, lights, and security devices to the post-tensioned slab using embedded anchors.
   2. Drilled anchors, power-driven fasteners, and core drilling for sleeves or other penetrations are not allowed unless authorized in writing by Architect.
      a. Power-driven fasteners are permitted if the depth of embedment is not greater than 3/4 inch.
   3. Penetrations within a 90-degree bearing cone and within 18 inches of an anchorage shall be formed with ASTM A 53/A 53M, Schedule 40 steel pipe.
      a. Penetrations are not permitted within a 90-degree bearing cone closer than 6” to an anchorage.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to installation and stressing of post-tensioning tendons including, but not limited to, the following:
      a. Construction schedule and availability of materials, personnel, and equipment needed to make progress and avoid delays.
      b. Storage of post-tensioning materials on-site.
      c. Coordination of post-tensioning installation drawings and nonprestressed reinforcing steel placing drawings.
      d. Horizontal and vertical tolerances on tendons and nonprestressed reinforcement placement.
      e. Marking and measuring of elongations.
      f. Submittal of stressing records and requirements for tendon finishing.
      g. Removal of formwork.

1.6 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Post-tensioning coating.
   2. Tendon sheathing.
   3. Anchorage devices.
   4. Tendon couplers.
   5. Bar and tendon supports.
   6. Pocket formers.
   7. Sheathing repair tape.
   8. Stressing-pocket patching material.

B. Shop Drawings: Include the following, prepared by or under the supervision of a qualified professional engineer, detailing tendon layout and installation procedures:
   1. Installation drawings including plans, elevations, sections, and details.
   2. Numbers, arrangement, and designation of post-tensioning tendons.
   3. Tendon profiles and method of tendon support including chair heights and locations. Show tendon profiles at sufficient scale to clearly indicate all support points, with their associated heights.
   4. Tendon anchorage details including bundled tendon flaring.
   5. Tendon clearances around slab openings and penetrations.
   6. Construction joint locations, pour sequence, locations of anchorages and blockouts required for stressing.
   7. Stressing procedures and jacking force to result in final effective forces used in determining number of tendons required.
   8. Calculated elongations for each tendon.
   9. Details for horizontal curvature around openings and at anchorages.
   10. Details for corners and other locations where tendon layouts may conflict with one another or nonprestressed reinforcing steel.
   11. Locations of nonprestressed reinforcement required for installing post-tensioning tendons including, but not limited to, the following:
      a. Support bars.
      b. Backup bars and hairpins at anchorages.
      c. Hairpins at locations of horizontal curvature.
      d. Supplemental reinforcement at blockouts.

C. Samples: For the following products:
   1. Anchorage device assembly with a minimum of 24 inches of coated, sheathed strand.
   2. Coupler assembly with a minimum of 24 inches of coated, sheathed strand.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include resume of individual supervising installation and stressing of post-tensioning tendons.

B. Mill Test Reports: Certified mill test reports for prestressing strand used on Project indicating that strand is low relaxation and including the following:
   1. Coil numbers or identification.
   2. Breaking load.
   3. Load at 1 percent extension.
   4. Elongation at failure.
   5. Modulus of elasticity.
   6. Diameter and net area of strand.

C. Procedures Statement: Procedures for cutting excess strand tail and patching stressing pocket.

D. Stressing Jack Calibration: Calibration certificates for jacks and gages to be used on Project. Calibrate each jack-and-gage set as a pair.

E. Stressing Records: Submit the same day as stressing operations.

F. ICC-ES Evaluation Reports: For evidence of Building Code compliance:
   1. Anchorage device.
   2. Coupler assembly.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Fabricating plant certified by PTI according to procedures set forth in PTI's "Manual for Certification of Plants Producing Unbonded Single Strand Tendons."

B. Installer Qualifications: A qualified installer whose full-time Project superintendent has successfully completed PTI's Level 1 - Field Fundamentals course or has equivalent verifiable experience and knowledge acceptable to Architect.
   1. Superintendent must receive training from post-tensioning supplier in the operation of stressing equipment to be used on Project.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle post-tensioning materials according to PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."

B. Immediately remove damaged components from Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain post-tensioning materials and equipment from single source.
   1. Stressing jacks not provided by post-tensioning supplier must be calibrated and approved for use on Project by post-tensioning supplier.

2.2 PRESTRESSING TENDONS

A. ACI Publications: Comply with ACI 423.6, "Specification for Unbonded Single Strand Tendons," unless otherwise indicated in the Contract Documents.

B. Prestressing Strand: ASTM A 416/A 416M, Grade 270, uncoated, seven-wire, low-relaxation, 0.5 inch-diameter strand.

C. Post-Tensioning Coating: Compound with friction-reducing, moisture-displacing, and corrosion-inhibiting properties; chemically stable and nonreactive with prestressing steel, nonprestressed reinforcement, sheathing material, and concrete.
   1. Minimum Coating Weight: 2.5 lb for 0.5 inch-diameter strand per 100 feet of strand.
   2. Completely fill annular space between strand and sheathing over entire tendon length with post-tensioning coating.

D. Tendon Sheathing:
   1. Minimum Thickness: 0.050 inch for polyethylene or polypropylene with a minimum density of 0.034 lb/cu. in.
   2. Continuous over length of tendon between anchorages to prevent intrusion of cement paste or loss of coating.

E. Anchorage Device and Coupler Assembly: Assembly of strand, wedges, and anchorage device or coupler complying with static and fatigue testing requirements and capable of developing 95 percent of actual breaking strength of strand.
   1. Anchorage Bearing Stresses: Comply with ACI 423.6 for stresses at transfer load and service load.
   2. Fixed-End Anchorage Device Assemblies: Plant fabricated with wedges seated at a load of not less than 80 percent and not more than 85 percent of breaking strength of strand.

2.3 NONPRESTRESSED STEEL BARS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content a minimum of 60 percent.

B. Support Bars, Reinforcing Bars, Hairpins:
   1. Steel: ASTM A 615/A 615M, Grade 60, deformed.
   2. Low-Alloy Steel: ASTM A 706/A 706M, deformed.

C. Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening tendons and tendon support bars in place. Manufacture bar supports, according to CRSI's "Manual of Standard Practice," from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
   1. For uncoated bars, use CRSI Class 1 plastic-protected bar supports.

2.4 ACCESSORIES

A. Pocket Formers: Capable of completely sealing wedge cavity; sized to provide the required cover over the anchorage and allow access for cutting strand tail.

B. Anchorage Fasteners: Uncoated-steel nails, wires, and screws used to attach anchorage devices to formwork.

C. Sheathing Repair Tape: Elastic, self-adhesive, moistureproof tape with minimum width of 2 inches, in contrasting color to tendon sheathing; nonreactive with sheathing, coating, or prestressing steel.

2.5 PATCHING MATERIAL

A. One-component, polymer-modified, premixed patching material containing selected silica aggregates and portland cement, suitable for vertical and overhead applications. Do not use material containing chlorides or other chemicals known to be deleterious to prestressing steel or material that is reactive with prestressing steel, anchorage device material, or concrete.

PART 3 - EXECUTION

3.1 FORMWORK

A. Provide formwork for post-tensioned elements as specified in Division 03 Section "Cast-in-Place Concrete." Design formwork to support load redistribution that may occur during stressing operation. Ensure that formwork does not restrain elastic shortening, camber, or deflection resulting from application of prestressing force.

B. Do not remove forms supporting post-tensioned elements until tendons have been fully stressed and elongations have been approved by Architect.

C. Do not place concrete in supported floors until tendons on supporting floors have been stressed and elongations have been approved by Architect.

3.2 NONPRESTRESSED STEEL REINFORCEMENT PLACEMENT

A. Placement of nonprestressed steel reinforcement is specified in Division 03 Section "Cast-in-Place Concrete." Coordinate placement of nonprestressed steel reinforcement with installation of post-tensioning tendons.

3.3 TENDON INSTALLATION

A. Install tendons according to installation drawings and procedures stated in PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."
   1. Tolerances: Comply with tolerances in ACI 423.6 for beams and slabs.

B. Tendon Supports: Provide continuous slab bolsters or bars supported on individual high chairs spaced at a maximum of 42 inches o.c. to ensure tendons remain in their designated positions during construction operations and concrete placement.
   1. Support tendons as required to provide profiles shown on installation drawings. Position supports at high and low points and at intervals not exceeding 48 inches. Ensure that tendon profiles between high and low points are smooth parabolic curves.
   2. Attach tendons to supporting chairs and reinforcement without damaging tendon sheathing.
   3. Support slab tendons independent of beam reinforcement.

C. Maintain tendon profile within maximum allowable deviations from design profile as follows:
   1. 1/4 inch for member depth less than or equal to 8 inches.
   2. 3/8 inch for member depth greater than 8 inches and less than or equal to 24 inches.
   3. 1/2 inch for member depth greater than 24 inches.

D. Maintain minimum radius of curvature of 480 strand diameters for lateral deviations to avoid openings, ducts, and embedded items. Maintain a minimum of 2 inches of separation between tendons at locations of curvature.

E. Limit tendon bundles to 4 tendons in slabs and 8 tendons in beams. Do not twist or entwine tendons within a bundle. Maintain a minimum distance of 12 inches between centers of adjacent bundles in slabs.

F. If tendon locations conflict with nonprestressed reinforcement or embedded items, tendon placement governs. Obtain Architect's approval before relocating tendons or tendon anchorages that interfere with one another.

G. Deviations in horizontal spacing and location of slab tendons are permitted when required to avoid openings and inserts.

H. Installation of Anchorage Devices:
   1. Place anchorage devices at locations shown on approved installation drawings.
   2. Do not switch fixed- and stressing-end anchorage locations.
   3. Attach pocket formers, intermediate anchorage devices, and stressing-end anchorage devices securely to bulkhead forms. Install stressing-end and intermediate anchorage devices perpendicular to tendon axis.
   4. Install tendons straight, without vertical or horizontal curvature, for a minimum of 12 inches behind stressing-end and intermediate anchorages.
   5. Embed intermediate anchorage devices at construction joints in first concrete placed at joint.
   6. Minimum splice length in reinforcing bars at anchorages is 24 inches. Stagger splices a minimum of 60 inches.
   7. Place fixed-end anchorage devices in formwork at locations shown on installation drawings. Support anchorages firmly to avoid movement during concrete placement.

I. Maintain minimum concrete cover as indicated on drawings and as follows:
   1. From exterior edge of concrete to wedge cavity: 2 inches.
   2. From exterior edge of concrete to strand tail: 1 inch.
   3. Top and bottom concrete cover for anchorage devices: 1 inch.

J. Maintain minimum clearance of 2 inches between tendons and openings.

K. Prior to concrete placement, mark tendon locations within 2-1/2 inches of soffits on formwork with spray paint.
   1. Do not spray paint formwork for soffits exposed to view. Use alternative method of marking tendon locations that will not visibly mar exposed soffit.

L. Do not install sleeves within 18 inches of anchorages after tendon layout has been inspected.

M. Do not install conduit, pipe, or embeds requiring movement of tendons after tendon layout has been inspected.

N. Do not use couplers unless approved by Architect.

3.4 SHEATHING INSPECTION AND REPAIR

A. Inspect sheathing for damage after installing tendons. Repair damaged areas by restoring post-tensioning coating and repairing or replacing tendon sheathing. Limited damage, tears up to 4 inches, is permitted if approved by the Architect.
   1. Ensure that repaired sheathing is watertight and there are no air voids.
   2. Follow tape repair procedures in PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."

B. Maximum length of exposed strand behind anchorages is as follows:
   1. Fixed End: 12 inches.
   2. Intermediate and Stressing End: 1 inch.
      a. Cover exposed strand with sheathing repair tape to prevent contact with concrete.

C. Immediately remove and replace tendons that have damaged strand.

3.5 CONCRETE PLACEMENT

A. Do not place concrete until placement of tendons and nonprestressed-steel reinforcement has been inspected by Testing Agency.

B. Provide Architect and Testing Agency a minimum of 48 hours' notice before concrete placement.

C. Place concrete as specified in Division 03 Section "Cast-in-Place Concrete." Ensure compaction of concrete around anchorages.

D. Ensure that position of tendon and nonprestressed-steel reinforcement does not change during concrete placement. Reposition tendons and nonprestressed-steel reinforcement moved during concrete placement to original location.

E. Ensure that method of concrete placement does not damage tendon sheathing. Do not support pump lines, chutes, or other concrete-placing equipment on tendons.

3.6 TENDON STRESSING

A. Calibrate stressing jacks and gages within 30 days prior to start of project and at least every six months thereafter. Keep copies of calibration certificates for each jack-and-gage pair on Project site that are available for inspection. Exercise care in handling stressing equipment to ensure that proper calibration is maintained.

B. Stress tendons only under supervision of a qualified post-tensioning superintendent.

C. Do not begin stressing operations until concrete strength has reached 3000 psi as indicated by compression tests of field-cured cylinders.

D. Complete stressing within 48 hours from start of stressing.

E. If concrete has not reached required strength, obtain Architect's approval to partially stress tendons and delay final stressing until concrete has reached required strength.

F. If detensioning and restressing of tendon is required, discard wedges used in original stressing and provide new wedges.

G. Submit stressing records within one day of completion of stressing. If discrepancies between measured and calculated elongations exceed plus or minus 7 percent, resolve these discrepancies to satisfaction of Architect.

H. Prestressing will be considered acceptable if gage pressures shown on stressing record correspond to required stressing force and calculated and measured elongations agree within 7 percent.

I. If measured elongations deviate from calculated elongations by more than 7 percent, additional testing, restressing, strengthening, or replacing of affected elements may be required.

3.7 TENDON FINISHING

A. Do not cut strand tails or cover anchorages until stressing records have been reviewed and approved by Architect.

B. Cut strand tails as soon as possible after approval of elongations.

C. Cut strand tail between 1/2 and 3/4 inch from wedges. Do not damage tendon or concrete during removal of strand tail. Acceptable methods of cutting strand tail include the following:
   1. Oxyacetylene flame.
   2. Abrasive wheel.
   3. Hydraulic shears.
   4. Plasma cutting.

D. Patch stressing pockets within one day of cutting strand tail. Clean inside surface of pocket to remove laitance or post-tensioning coating before installing patch material. Finish patch material flush with adjacent concrete.

3.8 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified Testing Agency to perform tests and inspections.
   1. Before concrete placement, Testing Agency will inspect the following for compliance with post-tensioning installation drawings and the Contract Documents:
      a. Location and number of tendons.
      b. Tendon profiles and cover.
      c. Installation of backup bars, hairpins, and other nonprestressed reinforcement shown on post-tensioning installation drawings.
      d. Installation of pocket formers and anchorage devices.
      e. Repair of damaged sheathing.
   2. Testing Agency will record tendon elongations during stressing.
   3. Testing Agency will immediately report deviations from the Contract Documents to Architect.

B. Prepare test and inspection reports.

3.9 PROTECTION

A. Do not expose tendons to electric ground currents, welding sparks, or temperatures that would degrade components.

B. Prevent water from entering tendons during installation and stressing.

C. Provide weather protection to stressing-end anchorages if strand tails are not cut within 10 days of stressing the tendons.

3.10 REPAIRS

A. Submit repair procedure to Architect for evaluation and approval.

B. Do not proceed with repairs requiring removal of concrete unless authorized in writing by Architect.

END OF SECTION

SECTION 034900

GLASS FIBER REINFORCED CONCRETE (GFRC)

PART 1 - GENERAL

1.1 SUMMARY

A. Work Includes: Glass fiber reinforced concrete column covers and wall panels.

B. Related Sections:
   1. Section 072700 – Air Barriers.
   2. Section 076000 – Flashing and Sheet Metal.
   3. Section 079200 – Joint Sealants.

1.2 DEFINITIONS

A. GFRC: Glass fiber reinforced concrete.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: Manufacturer is responsible for designing units, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   1. Comply with Section 014450 for building envelope requirements.
   2. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   3. Provide concealed fastening wherever possible.
   4. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of barrier wall system, including supports and anchoring.
   5. Attachment Considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units.
   6. Comply with PCI quality control criteria including PCI MNL-128 and MNL-130. Included are drawings, development of testing program, interpretation of test results, and comprehensive engineering analysis showing compliance with performance and other Specification requirements.

B. Interface With Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections for structural members in installation.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Manufacturer’s descriptive literature.

C. Shop Drawings: Plans and sections indicating; locations, shapes, and sizes of GFRC units and adjacent construction.
   1. Stamp with seal and signature of professional engineer responsible for design.
   2. Fabrication details, reinforcing, fastening devices, and accessories.
   3. Show methods of support and attachment.
   4. Submit total layout, including dimensions, construction details, profiles, supports, anchorage, trim, flashing, and methods of anchorage and attachment.
   5. Show details of weatherproofing at edges, terminations, and change of profiles.
   6. Indicate panel terminations and transitions, including intersections with roof panels, adjacent materials, and change of direction pieces.
   7. Clearly indicate field and factory applied sealant locations.
   8. Show wall substrates including subframing and fasteners.
   9. Include elevation showing complete layout of each wall.

D. Samples: Submit 8 by 8 inch in size illustrating color, texture, and finish. Submit multiple sample if color variations are expected showing light, dark, and mid-range finishes.

E. Informational Submittals: Submit following:
   1. Qualification data: Manufacturer's and engineer's qualification data.
   2. Qualification data: Installer's qualification data.
   3. Manufacturer's instructions.
   4. Manufacturer's field reports.

F. Closeout Submittals: Submit following in accordance with Section 017800.
   1. Maintenance data.
   2. Warranty.
   3. Project Record Documents: Show method for replacement of panels.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish entire system from one manufacturer, unless otherwise acceptable to Architect.

B. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of five years experience in design of GFRC wall system and related subframing backup systems.

C. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years experience.
   1. Manufacturer: PCI certified as GFRC producer.
   2. Certify compliance with PCI MNL-130 Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products for manufacture, fabrication, and quality control requirements.

D. Installer Qualifications: Acceptable to manufacturer with experience on at least five projects of similar nature in past five years.

E. Certifications: Submit following:
   1. Fabricator's certification that products furnished for Project meet or exceed specified requirements.
   2. Engineering Certifications: Certified statement, signed and sealed by professional engineer responsible for design attesting following:
      a. Conformity to applicable governing codes;
      b. Conformity to criteria specified in Contract Documents;
      c. Conformity to Section 014450 – Building Envelope Design Requirements;
      d. Component parts were properly designed or selected for locale and application intended;
      e. Capability of GFRC system to safely withstand design loads.
      f. Installation was made in accordance with approved Shop Drawings.

1.6 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference complying with Section 013100 after approval of complete submittal and prior to beginning field sample installation.

B. Meet with Owner; Architect; testing and inspecting agency representative; GFRC wall panel Installer; GFRC wall panel manufacturer's representative; structural-support Installer; and installers whose work interfaces with or affects GFRC wall panels including installers of doors, windows, and louvers.
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review methods and procedures related to GFRC wall panel installation, including manufacturer's written instructions.
   3. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
   4. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal-faced composite wall panels.
   5. Review governing regulations and requirements for tests and inspections if applicable.

6. Review temporary protection requirements for GFRC wall panel assembly during and after installation.
7. Review wall panel observation and repair procedures after GFRC wall panel installation.

1.7 FIELD SAMPLES

A. General: Comply with Section 014000.
   1. Sample Installation:
      a. Install three contiguous GFRC wall panels in final position with associated trim in location as directed by Architect.
      b. Install custom corner as directed.
      c. Show finishing of joints between units, trim edge finishing, and construction techniques.
   2. Accepted panels may remain in final Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 016000.
   1. Comply with manufacturer's recommendations for storing and handling units.
   2. Deliver GFRC units in factory-wrapped crates, packaged to keep units dry and avoid excessive stresses and damage.
   3. Storage and Protection: Store GFRC units at Project site to prevent cracking, distortion, warping, staining, or other physical damage.
   4. Store GFRC wall panels, covered with suitable weathertight and ventilated covering. Store wall panels to ensure dryness, with positive slope for drainage of water. Do not store GFRC wall panels in contact with other materials that might cause staining, cracking, or other surface damage.

1.9 WARRANTY

A. Comply with provisions of Section 017800.

B. Warrant installed system and components to be free from defects in material and workmanship for period of 5 years.
   1. Include coverage against leakage and damages to finishes.
   2. Include provisions for structural, cohesive, and finish integrity of GFRC units. Repair or replace units which exhibit cracking, splitting, chipping, spalling, detachment from substrates, staining or other finish imperfections resulting from normal and anticipated building conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Clark-Pacific, West Sacramento, CA or a comparable product of one of the following:
   1. Casting Designs, Inc. (CDI), Fort Worth, TX.
   2. Formglas Inc., San Jose, CA.
   3. Moonlight Molds, Gardena, CA.
   4. Plastrglas, Inc., Omaha, NE.
   5. Clark-Pacific, West Sacramento.

2.2 MATERIALS

A. Cement:
   1. ASTM C150, Type I or III.
   2. Use only one brand, type and source of cement for entire Project.

B. Aggregate: ASTM C33, fine and coarse aggregate for each type finish from one source for entire Project.

C. Pigment: ASTM C979, synthetic mineral oxide, stable at high temperature, resistant to ultra-violet light and alkali-resistant.

D. Glass Fibers: Alkaline resistant, PCI MNL128.

E. Admixtures: Only use admixtures which have been tested and accepted in mix designs.
   1. Air Entraining: ASTM C260.
   2. Water-reducing Admixture: ASTM C494.
   3. Calcium chloride or admixtures containing chloride ions or other salts are not permitted.

F. Connections and Supporting Devices :
   1. Steel Plates and Shapes: ASTM A36, with one coat manufacturer's standard primer.
   2. Attachment Hardware and Anchors: Type 304 stainless steel.

G. Mold Release Agents: Type required by manufacturer.

H. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete.

2.3 ACCESSORIES

A. Joint Sealants: Comply with Section 079200 for joint sealants and related components to be installed as work of this Section.
   1. Sealants shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

2.4 MIXES

A. GFRC Mix:
   1. Combine portland cement, glass fibers, sand, and selected admixtures in proper proportions to meet design requirements.
   2. Glass fiber content: 5 percent minimum.

B. Facing Mix:
   1. Aggregate, color and texture to match approved field sample.
   2. Shall not contain glass fibers.

C. Coloring Agent: Not to exceed 10 percent of cement weight.
   1. Color and Texture: As selected by Architect and matching approved field sample.

2.5 FABRICATION

A. GFRC: Fabricate units as large as possible to minimize joints.
   1. Reinforce members to be self-supporting and to support inserts and surface attached materials.
   2. Repair hollows, voids, scratches, and finish surface imperfections.
   3. Density: 120 PCF minimum.

B. Molding Materials:
   1. Provide forms and molds made of metal, plastic, or wood to produce required finish surfaces.
   2. Use form release agent compatible with architectural finish and joint sealants.

C. Connecting and Supporting Devices: Embed internal anchors, inserts, plates, angles, and other sprayed-in items as indicated on shop drawings.
   1. Weld steel fabrications in accordance with AWS D1.1.
   2. Locate hoisting devices to permit device removal after erection.

D. Spray-up concrete mix in multiple passes; maintain consistent quality during manufacture.

E. Facing Materials: Place facing materials into forms so that there will be no displacement during GFRC application.

F. Curing: After initial curing, remove units from mold and place in manufacturer's required controlled curing environment.

G. Identification:
   1. Mark each unit to correspond to identification mark on erection drawings, in location not visible in finish work.
   2. Mark each unit with date cast.

H. Fabricating Tolerances: For dimensional tolerances not listed below, comply with PCI MNL 117.
   1. Overall Dimensional: Plus/minus 1/8 inch.

2. Skin Thickness: Plus 1/8 inch, minus 0.
3. Total Thickness: Plus 1/4 inch, minus 0.
4. Warpage or Bowing: Plus/minus 1/16 inch per foot, 1/4 inch maximum.

2.6 FINISH

A. General: Ensure exposed-to-view finish surfaces are uniform in color, texture, and appearance.
   1. Treat surfaces in continuous operation to achieve uniform appearance.
   2. Do not change equipment, materials, or procedure for surface treatment during Work.
   3. Discard and replace, or correct finish of units which do not appear identical to approved sample.

B. Color and Texture: As selected by Architect and matching approved field sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.
   1. Site Verification of Conditions:

3.2 GFRC INSTALLATION

A. General: Install in accordance with Section 017300 and approved shop drawings.
   1. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances.
   2. Lift members at points provided by fabricator.
   3. Align and maintain uniform horizontal and vertical joints as erection progresses. Align surfaces on outside face.

B. Attachment: Connect to structural work with steel connections which can be adjusted to accommodate specified tolerances for structural frame.
   1. Fasten units in place by bolting or welding or both as shown on approved shop drawings.
   2. Draw nuts and bolts tight. Spoil bolt threads or spot weld nut to prevent nuts from backing off.
   3. Perform field welding in accordance with AWS D.1.1 by qualified welders using equipment and materials compatible to base metal.
   4. Touch-up field welds with zinc-rich paint.

C. Erection Tolerances: Comply with PCI MNL 128. Tolerances are not cumulative.

D. Adjust connections so that units are level and joints are within specified tolerances.

E. Joint Sealants: Provide joint sealants in joints between units and between units and adjacent construction with silicone sealant in accordance with Section 079200.

F. Patching: Field patch minor chips and dents to match color and texture of surrounding material.

G. GFRC Units may be Rejected for Following Reasons:
   1. Exceeding specified installation tolerances.
   2. Chipped, cracked or otherwise damaged during construction operations.
   3. Exposed-to-view surfaces which develop surface finish deficiencies.
   4. Other defects as listed in PCI MNL128.

3.3 CLEANING

A. General: Comply with Section 017400.
   1. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.

3.4 PROTECTION

A. Protect finished work in accordance with Section 017300.

END OF SECTION

SECTION 035400

CAST UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Leveling of concrete floors for application of large format porcelain tile.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort
   2. Underlayment must not exceed the VOC and chemical component limits of South Coast Air Quality Management District Rule #1168 and Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for underlayment.
   2. Indicate trade name of system proposed, generic name and type, performance characteristics, and chemical resistance.

C. Submit following Informational Submittals:
   1. Test Reports: Submit written results of testing specified as part of Field Quality Control article.
   2. Certifications specified in Quality Assurance article.
   3. Qualification Data: Manufacturer's and applicator's qualification data.
   4. Manufacturer's instructions.
   5. Manufacturer's field reports.

D. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit EQc4.3: Provide coating VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Cast Underlayment

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.

B. Applicator Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.

C. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.4 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Verify existing conditions, preparation requirements, and finishing requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

1.6 PROJECT CONDITIONS

A. Do not install underlayment until floor penetrations and peripheral work is complete.

B. Environmental Requirements:
   1. Underlayment is for interior use only.
   2. Enclose building interior before, during and after installation.
   3. Comply with more restrictive of following or manufacturer's written requirements under which products can be installed.
   4. Maintain minimum ambient temperature of 50 degrees F for 24 hours prior, during, and 72 hours after installation of underlayment.
   5. Ventilate spaces to remove excess moisture during curing process. 5-7 days are usually adequate drying time. Test for dryness in accordance with manufacturer's recommendations.

1.7 WARRANTY

A. Comply with provisions of Section 017800.

B. Provide written warranty, in a form acceptable by Owner, from material manufacturer and countersigned by applicator, stating that system installed will perform satisfactorily for period of 5 years from date of Substantial Completion.

C. Warranty with disclaimer disallowing implied warranties of merchantability and/or fitness for a particular purpose or other disclaimers that reduce Owner protection is not acceptable.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Interior Self-Leveling Cement Based Products and Manufacturers:
   1. Ardex K-15, Ardex, Inc.
   2. Ultraplan 1 Plus, Mapei.
   3. 86 Self-Leveling, Laticrete.
   4. Super Flo Top, Euclid Chemical Company.

2.2 MATERIALS

A. Underlayment:
   1. Type: Non-shrinking, self-leveling, cement based mix, containing no gypsum, for use over concrete substrates.
   2. Thickness: Featheredge up to 1 inch.
   3. Subfloor Adhesive VOC: Less than 50 g/L,.
   4. Compressive Strength: 3000 psi minimum at 28 days.

B. Subfloor Adhesives shall meet or exceed the VOC and chemical component limits of SCAQMD Rule 1168 and Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.

C. Bonding Agent/Crack Fillers: Type recommended by underlayment manufacturer for use over substrate encountered.

D. Sand: Comply with underlayment manufacturer requirements.

E. Water: Potable; free from impurities.

2.3 MIXES

A. Site mix materials in accordance with manufacturer's instructions.

B. Mix to achieve self-leveling consistency as recommended by manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify substrate surfaces are clean, dry, unfrozen, free from efflorescence, wax, curing compounds, and do not contain petroleum by-products or other compounds detrimental to underlayment material bond to substrate.

3.2 PREPARATION

A. Remove substrate irregularities. Fill voids and deck joints with filler. Finish smooth.

B. Seal penetrations through substrate.

C. Vacuum clean surfaces.

D. Prime substrate in accordance with manufacturer's instructions. Allow to dry.

3.3 INSTALLATION

A. Install underlayment in accordance with Section 017300.

B. Install underlayment before partition installation.

C. Place to thickness indicated.

D. Place to 3/4 inch thickness.

E. Maintain top surface level to within 1/8 inch in 10 feet.

F. Air cure in accordance with manufacturer's instructions.

3.4 FIELD QUALITY CONTROL

A. General: Comply with requirements of Section 014500.

B. Tests:
   1. Field tests will be performed for compressive strength verification using 2 inch cube molds.
   2. Perform thickness measurements for every 100 square feet of underlayment while material is in liquid state.

C. Manufacturer's Field Services:
   1. Notify manufacturer prior to start of Work and make arrangements for manufacturer's technical representative to be present during first day's work to verify work is being conducted in accordance with their recommendations.
   2. Submit summary report.

3.5 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Do not permit traffic over unprotected floor. Place temporary wood planking or plywood over underlayment wherever it will be subjected to traffic or concentrated loads.

END OF SECTION

DIVISION 04

MASONRY

SECTION 04 21 00
GLADDING, McBEAN
ARCHITECTURAL TERRA COTTA
August 22, 2013

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Provide new terra cotta as indicated on Drawings.

2. Detail, furnish, and install all support, anchorage, and connection devices and coordinate size and configuration and with all other elements of the work.

B. Related Sections:

1. Section 01300 – Submittals.

2. Section 04150 – Terra Cotta Repair.

3. Section 04212 – Structural Anchoring of Terra Cotta

4. Section 04510 – Masonry Cleaning.

1.02 REFERENCES

A. ASTM C212 – Standard Specification for Structural Clay Facing Tile.

B. ASTM C126 – Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.

C. ASTM C67 – Standard Methods of Sampling and Testing Brick and Structural Clay Tile.

1.03 QUALITY ASSURANCE

A. Subcontractor Qualifications: All work shall be performed by mechanics experienced in the handling and setting of the material having not less than five (5) years satisfactory experience in comparable fabrication and installation of new Terra Cotta including work on at least two (2) projects similar in scope and scale to this Project. Submit references with name of contact person and telephone number for the two (2) submitted similar projects.

B. Manufacture's Qualifications:

1. All terra cotta work shall be by a manufacturing firm normally in business of producing work of the type indicated and shall be capable of submitting proof to the Architect/Engineer as follows:

a. Length of Time in this Kind of Manufacturing: Five (5) years.

b. Photographs and Job Description: At least three (3) previous jobs.

C. Installer's Qualifications:

1. All terra cotta work shall be by installed by a firm normally in business of installing work of the type indicated and shall be capable of submitting proof to the Architect/Engineer as follows:

a. Length of Time in this Kind of Installation: Ten (10) years.

b. Photographs and Job Description: At least two (2) previous jobs.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop and Setting Drawings:

1. Terra Cotta Installation:

a. The Contractor or Architect shall furnish the Terra Cotta manufacturer with all drawings, details and information necessary for the manufacture of terra cotta units, including drawings of all classes of work with which the Terra Cotta engages, proposed method of installation, and elevations showing location of the units to be replaced.

b. Whenever Terra Cotta is required to match in contour, color finish and surface treatment, existing Terra Cotta, as for example in connection with alterations of additions to existing work, the Terra Cotta manufacturer shall be furnished with the required profiles and samples of the original work and other needed information.

2. Submit shop, fabrication and setting drawings to the Customer for approval by both the Architect and the Contractor prior to production of any material. Contractor shall be responsible for all field dimension verification.

Shop drawings shall show sections, dimensions and connection with other work. These drawings must conform as nearly as practicable to the Architect's drawings, but shall be in accordance with good Terra Cotta structural practice.

3. Anchorage: Terra Cotta unit anchorage shall be designed by Contractor's Structural Engineer and submitted to the Architect/Engineer for approval. The attachment design will withstand loads from wind, earthquake, gravity, building movement, and thermally induced movement according to the requirements of the governing Building Code and good engineering practice.

4. The Terra Cotta manufacturer shall provide [ ] copies of the complete set of scale shop drawings to be used for setting and showing the piece numbering of the Terra Cotta, and the size of the joints to be used for setting the various portions of the work clearly indicated. These drawings shall be designated as the setting drawings.

C. Samples:

1. If a restoration, the customer shall provide a cleaned full size Terra Cotta unit control sample representing required color, texture and finish.

2. Preliminary Color Sample Approval: Submit two (2) 3” x 5” samples showing typical color range for preliminary acceptance.

3. Final Approval: After approval of the preliminary color sample, submit two (2) 12” X 12” final samples, and/or full prototype samples which when inspected and approved become the standard for quality, color range, texture and color finish. All materials shall conform to the approved samples within the range, subject to normal ceramic variation.

Submit manufacturer’s specifications and other product data for each manufactured product including instructions for storage, handling and use.

D. Contractor to submit details and procedures for incremental protection of completed work. As a minimum, install protection after installation of each eight feet height of completed terra cotta wall.

E. Material Testing:

1. Test in accordance with ASTM C67 to determine compressive strength and absorption. Use a certified lab for testing. Manufacturer to supply current test data.

F. Field Sample for New Construction:

1. After acceptance of sample submittal, but prior to commencement of work under this Section, prepare a working field sample if required of new terra cotta unit installation. Demonstrate all methods, materials and workmanship required for the Project. Approved field sample will serve as a standard for the balance of terra cotta unit installation procedures. If approved, field sample may or may not remain as part of the finished work.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packing and crating of the Architectural Terra Cotta shall be done by the manufacturer to prevent damage to the units in transit by normal handling methods Delivery shall be made to correspond to priority sequencing as directed by the customer. All crates will be delivered F.O.B. job site unless otherwise requested.

B. The Contractor becomes responsible for the product at the time it is received.

C. The contractor has a 72-hour window for inspecting the delivery. Any non-conformity must be communicated to the Manufacturer immediately and in writing, within that time frame.

D. If any pieces of Terra Cotta are damaged in transit, the manufacturer shall be immediately notified in writing by the setting contractor and proceed with the remaking of the pieces. The responsibility for the cost of such replacements shall be determined by the point of delivery outlined in the contract. The customer shall assume responsibility for the necessary proof of damage.

E. Storage at Job Site or Production Facility:

1. Units shall stay in their original packing material until ready for use. Crates shall not be stacked, and shall remain in an upright position. Store units on firm, level and smooth surface. The units shall be protected from weather before setting, to prevent staining.

2. The manufacturer is responsible for providing the Architectural Terra Cotta only. All other labor, materials, products, and equipment necessary to setting and installing the

units in accordance with the construction documents and specifications, and the labor to do so, must be provided by the Customer.

1.06 JOB CONDITIONS

A. Cold Weather: Perform work in accordance with ACI 530.1 current edition.

B. Hot Weather: Perform work in accordance with ACI 530.1 current edition.

C. At end of the working day, or during rainy weather, cover masonry work exposed to weather with waterproof coverage and securely anchor as necessary.

D. Protection: Adequately protect and do not damage existing construction to remain.

PART 2 PRODUCTS

2.01 TERRA COTTA AND ACCESSORIES

A. Terra cotta units shall be as outlined on Architectural Drawing with respect to exterior appearance and profile.

1. Manufacture all pieces for particular installation conditions to minimize any cutting in the field. Contractor to adjust individual pieces to accommodate setting sequence.

(In concrete or steel frame buildings, the veneer or facing material should be fully and continuously supported, at each floor level on shelf supports, of adequate strength and stiffness, rigidly connected to the structural frame. Steel shelf angles or supports, in all cases, should be located in mortar joints. The strength of the Terra Cotta should not be unnecessarily reduced by cutting the webs to receive the steel.)

2. Adjust Terra Cotta to accommodate relieving angles, vents, weeps, expansion joints, etc.

a. Proper provision should be made for expansion joints, at shelf supports, over column cases, etc., to prevent the development of disruptive stresses caused by deflection, wind pressure, temperature changes, settlement and like forces.

b. Properly constructed flashing should be provided.

c. Reglets shall be provided to receive gutter linings and flashing when the joints cannot be used for the purpose. Reglets shall be not less than ¾” deep, unless otherwise specified.

d. The volume changes incident to the setting and hardening of concrete, and the variations in volume of concrete due to humidity and temperature conditions, require provisions to allow free movement of the supporting frame and make it undesirable to complete fill a facing applied to a concrete structure.

B. Install by anchored method as required by referenced standards and as described on approved shop drawings.

C. Quality Control:

1. Terra Cotta units shall conform to the physical requirements listed below as performed in accordance with ASTM Specifications.

a. Compressive Strength – ASTM C 67

b. Absorption (5 hour boil) – ASTM C 67

c. Saturation Coefficient – ASTM C 67

d. Crazing – ASTM C 126

2. Face Dimension Tolerances for sized/cut units: The face dimensions (length and width) shall not vary more than 1/16 inch plus or minus the dimensions specified on the setting drawings.

Face Dimension Tolerances for uncut/net units: The face dimensions (length and width) shall not vary more than 1/8 inch plus or minus per linear foot.

3. Warpage Tolerances for handmade units: The exposed face shall not vary from a true plane more than the existing original Terra Cotta units.

Warpage Tolerances for machine-extruded units: The exposed face shall not vary from a true plane by more than 0.005 inch per inch of length.

4. Finished faces that will be exposed when installed shall be free from chips, blisters or other imperfections detracting from the appearance of the finished wall when viewed from a distance of no less than 15 feet.

Terra Cotta Specifications

Test Average (based on 10 Samples)	Method	Criteria
Compressive strength – 6000 psi	ASTM C67	ASTM C126
Absorption (5 hour boil)	ASTM C67	
Absorption (24 hour soak) – 7.9%	ASTM C67	
Saturation Coefficient - .69	ASTM C67	
Craze resistance	ASTM C126	ASTM C126
Glaze absorption - .15%	ASTM C67	
Freeze/thaw resistance	ASTM C67	100 cycles without degradation

D. All anchors, hangers, bolts, clips, straps, rods and pins for securing Terra Cotta shall be of stainless steel or galvanized steel.

2.02 MORTAR AND GROUT MATERIALS

A. Mortars shall comply with ASTM C-270.

B. Grouts shall conform to ASTM C-476

C. Cementitious Materials:

- Portland Cement: ASTM C-150. Type I or II; low-alkali per ASTM C-150, Table 2.
- Hydrated Lime: ASTM C207, Type S
- Masonry cements, gypsum Portland cements, or blended Cements will not be allowed.

D. Aggregates:

1. Sand: Clean, washed natural or manufactured silica sand grated according to ASTM C144. sand contain no more than 50 parts per million of chloride ions, and shall be free of organic contaminants.
2. Coarse Aggregates: ASTM C404 with a maximum size of 3/8” diameter. Aggregate shall contain no more than 50 parts per million of chloride ions and shall be free of organic contaminants.

D. Water: Potable, clean and free from injurious amount of oil, alkali, organic matter or other deleterious material.

2.03 FABRICATION

A. Walls shall not be less than one inch thick and partitions shall be of such thickness and so spaced as to perform their proper functions with regard to form and structure. Necessary anchor holes and hand holes shall be provided in accordance with shop drawings so formed as to properly engage the structure. Beds generally shall be not less than 4” deep.

B. All joints shall be straight and true. All Terra Cotta shall be laid out at the factory to test it for uniformity of joint widths and over-all dimensions. Where necessary to secure accurate dimensions and uniform joint widths, the material shall be sized straight and true.

PART 3 EXECUTION

3.01 PREPARATION BY INSTALLER

A. Establish lines, levels, and coursing. Protect from disturbance.

B. Clean new unit prior to setting, leaving edges and surfaces free of dirt or foreign material. Do not use wire brushes or implements that mark or damage exposed surfaces.

1. Soak units in a vat or box of clean water for one hour or more just prior to installation. Units shall be noticeably damp at the time of setting. Units shall be drained sufficiently to eliminate surface water.

2. At the beginning of setting each day, soak all walls to be faced with clean water applied by a

hose and spray nozzle. Soak again with water not more than one hour before setting of unit.

3.02 INSTALLATION: GENERAL

a. *In Connection with Structural Steel*: Beams, channels, angles. T's, plates and fabricated members for supporting Terra Cotta and which are not secured to the structural steel by rivets or short bolts, as shown on the architect's drawings, together with all anchors, hangers, bolts, clips, straps, rods and pins for securing Terra Cotta, shall be furnished and set by the contractor for setting Terra Cotta.

b. *In Connections with Structural Concrete*: The contractor for structural concrete shall furnish and set all supporting metal work imbedded in the concrete and all shelf angles and continuous adds. All such metal work shall conform to the requirements of the setting drawings prepared by the Terra Cotta manufacturer.

c. All other loose anchors, such as clamps, hangers, clips, straps and pins shall be furnished and set by the Contractor for setting Terra Cotta.

d. Proper care should be exercised to prevent the corrosion of all steel supports, ties, etc. Where such protection cannot be permanently secured through encasement with mortar or concrete, or through the use of corrosion resistant metallic coatings, non-corrosive metals should be employed.

e. Exposed free-standing construction, subject to the absorption of water through mortar joints and liable to injury from subsequent freezing, or the expansion of improper filling material, should generally be left unfilled and should be ventilated by means of small, inconspicuously placed weep-holes indicated by W.H. on the plates.

f. Maintain uniform joint widths, matching existing.

g. Erection Tolerances:

1. Variation from Plumb: In accordance with ACI 530.1 current addition.

2. Variation from Level: In accordance with ACI 530.1 current addition.

3. Variation from True Plane: In accordance with ACI 530.1 current addition.

3.03 MIXING, MORTAR AND GROUT

A. Mix and proportion cementitious materials for site-made setting beds and grout:

1. Setting Mortar:
Use Type S mortar; in accordance with ASTM C270 with the following material mix proportion by volume:

Portland Cement: 1 part
Hydrated Lime: ½ part
Sand: 4 ½ parts

a. Color of mortar shall match building's existing cleaned mortar.
b. Use colored sand to obtain desired mortar color.

2. Mortar Grout: Setting mortar with sufficient additional water to cause the mixture to flow readily without segregation. This grout is used where the spacing between the terra cotta and the wall is between 5/8-inch and 3/4-inch, which spacing is permissible for shapes not exceeding 1000 square inches in surface area.

3. Pea Gravel Grout: 1 part Portland Cement, 3 parts sand and 2 parts graded pea gravel passing 3/8-inch sieve. This grout is used where the spacing behind the terra cotta is thicker than ¾-inch from the back of the face of the terra cotta unit or when filling large cells.

4. Pointing Mortar: Use setting mortar for new construction. If new construction is adjacent to existing, match color or mortar. If new Terra Cotta is to replace existing, refer to Section 04150 Terra Cotta Repair.

Mortar for Terra Cotta pointing:

Use Type N mortar (prehydrated for repointing), in accordance with ASTM C270, with the following partial mix proportion by volume:

Portland Cement: 1 part
Hydrated Lime: 1 part
Sand: 6 parts

Color of mortar shall match building's existing cleaned mortar.

Use colored sand to obtain desired mortar color.

3.04 SETTING FOR TERRA COTTA NON-CAVITY WALL

A. Just prior to commencement of setting, brush a coat of neat Portland Cement and water onto a limited area of the wall and the entire back of the piece of soaked terra cotta unit to be set.

B. Immediately thereafter spread half of the setting mortar coat on a limited area of the wall and the other half over the back of the terra cotta unit.

C. Screed the setting mortar trawled on the back of terra cotta unit to a uniform thickness as measured from the face of the terra cotta. Screed the other half of the setting mortar being applied to the wall surface to a true and plumb level.

D. The total thickness of the setting mortar coat shall average ¾-inch, but use sufficient mortar to create a slight excess, which will be forced out at the joints at the edge of the unit when tapped into place.

E. Firmly place the unit against the wall by repeated tapping with a rubber mallet to eliminate all voids in the setting bed.

F. Completely fill all voids and joints with appropriate mortar grout, or a pea gravel grout and made watertight. Rake out the face joints of each unit ½-inch to allow for pointing.

G. Anchorage and reinforcement shall be located in bed joints and/or interior webs as indicated on approved shop drawings. Clean and degrease anchors prior to setting in epoxied holes. Follow

manufacturer's instructions for proper cure of epoxy prior to setting.

H. Remove any Terra Cotta unit tipped away from the wall for readjustment or improperly set for any reason. Remove and clean away all mortar from units and wall surface, and reset in accordance with the above procedure.

I. Support each Terra Cotta unit, in addition to the usual centers and teflon or plastic wedges, with suitable bent vertical wooden shores exerting a constant upward pressure until the mortar coat is set for several days.

J. After setting, but prior to pointing, clean all exposed surfaces with natural fiber brushes, non-ionic mild soap powder or detergent and clean water.

3.05 POINTING JOINTS

A. Pointing

1. Refer to ASI 530.1 current addition for Hot and Cold Weather construction.

2. Wet joint thoroughly and repeatedly prior to pointing and between pointing lifts. Allow water to soak in so that no freestanding water is visible.

3. Point in two lifts; pack joints to within 3/8" of surface on first lift; allow first lift to set prior to pointing second lift.

4. As soon as mortar has taken its initial set, tool joint surfaces to be slightly concave, or to match existing sound mortar joint surfaces. Do not allow mortar to extend over edges of terra cotta units.

a. After initial 24 hour set, moisten until cured. Allow mortar to cure completely prior to cleaning operations, minimum 30 days.

b. Clean up after pointing operations are complete. Remove mortar stains, excess mortar, etc., from all surrounding surfaces. Do not use acids; rinse thoroughly after clean up operations.

All joints in overhanging Terra Cotta, balustrades, parapets and free standing features shall have joints raked out ½", backer rod, sealant and lead "T" installed.

B. Re-pointing - See Section 04150.3.03.B – Terra Cotta Repair

1. General: Do not repoint in temperatures over 90° F or under 40° F. Provide cover so that repointing may be accomplished without direct sunlight on the joints for up to eight (8) hours after repointing.

2. Clean up after repointing operations are complete. Remove mortar stains, excess mortar, etc., from all surrounding surfaces. Do not use acids; rinse thoroughly after clean-up operations.

3.06 CUTTING AND FITTING

A. Obtain Architect/Engineer concurrence prior to job site cutting and fitting any item not indicated on

drawing. Cutting and fitting of the Terra Cotta that may be required at the building, including all fitting around anchors, steel and ironwork and reinforced concrete, shall be done by the installation contractor. Do not impair appearance or strength of terra cotta.

B. All necessary face cutting of terra cotta at the job site shall be done with a saw using a water-cooled diamond blade. Face cutting shall not disturb the glaze.

3.07 CLEANING

A. Remove excess mortar from all surrounding surfaces upon completion of setting to prevent stains.

B. Clean area of work as specified.

3.08 PROTECTION

A. Protect and do not damage existing adjacent work to remain.

B. Protect new work from damage or staining due to construction operations.

1. All uncompleted walls including Terra Cotta and backing shall be protected by waterproof covering at night and at any time when liable to injury from storms or freezing.

C. On completion of construction, remove all temporary protection.

3.09 ACCEPTANCE

A. The completed installation shall have the acceptance of the Architect/Engineer/Owner. Remove and replace units that are chipped, cracked, or otherwise damaged which do not conform to the Specification requirements.

3.10 CLEAN-UP

A. Upon completion of Terra Cotta replacement operations, remove tools, equipment, and other unnecessary materials from site. Return adjacent area to the clean condition, which existed prior to the start of work.

B. Remove and legally dispose off-site all debris, rubbish, and other materials resulting from Terra Cotta installation.

END OF SECTION

SECTION 042200

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 01 apply to this sec

B. Section Includes:
   1. Concrete masonry units.
   2. Reinforcing steel.
   3. Mortar, grout and grouting.
   4. Bolts, anchors, hardware, metal frames, and other insert items.

C. Related Sections :
   1. Section 033000: Cast-In-Place Concrete.
   2. Section 051200: Structural Steel.

1.2 REFERENCES

A. American Society for Testing and Materials International (ASTM):
   1. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
   2. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
   3. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
   4. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
   5. ASTM C150 - Standard Specification for Portland Cement.
   6. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
   7. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
   8. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
   9. ASTM C426 - Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.
   10. ASTM C476 - Standard Specification for Grout for Masonry.
   11. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
   12. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
   13. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
   14. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

B. Masonry Standards Joint Committee (MSJC):
   1. ACI 530.1/ASCE6/TMS602 – Specification for Masonry Structures.
   2. ACI 530/ASCE5/TMS402 – Building Code Requirements for Masonry Structures.

1.3 SUBMITTALS

A. Mix Design: Submit grout and mortar mix designs. Mix designs shall be signed and sealed by a Civil or Structural Engineer registered in the State of California.

B. Product Data: Submit manufacturer's Product Data for assembly components, materials, and accessories. Submit certificates and data assuring that the proposed materials meet the specified ASTM standards.

C. Samples: Submit Samples for each type of required masonry unit, including reinforcement and accessories.

D. Shop Drawings: Indicate wall reinforcement, splice locations and bending diagrams.

E. Admixtures: Additives and admixtures to mortar and grout shall not be used unless approved by the enforcing agency. Submit product data for any proposed admixture.

1.4 REGULATORY REQUIREMENTS

A. Perform the Work in accordance with CBC, Chapter 21A.

B. Comply with requirements of ACI 530.1.

1.5 QUALITY ASSURANCE

A. Comply with the requirements of Specification Section 01420: Testing and Inspection.

B. Concrete Masonry Units:
   1. Notify the testing laboratory a minimum of 45 days in advance of installing concrete unit masonry, to allow for preconstruction testing of the units.
      a. Units will be sampled and tested in accordance with ASTM C140 for compressive strength, absorption and moisture content.
      b. Units will be sampled and tested in accordance with ASTM C426 for linear drying shrinkage.
   2. The material testing laboratory shall receive concrete masonry unit specimens for testing from masonry unit manufacturer. Number of specimens shall be as indicated in referenced ASTM standard tests. Testing laboratory will perform and send test results to the Architect and IOR.

C. Portland Cement: Submit certification from the cement manufacturer that the cement proposed for use on the project has been manufactured in accordance with ASTM C150. Certification shall include test results made on cement samples during production.

D. Mortar and Grout Tests: At the beginning of all masonry work, mortar and grout will be tested in accordance with CBC Section 2105A.5.
   1. Mortar: Shall conform to ASTM C270 and to the property specifications of CBC Table 2103A.8(2) for Type S mortar.
      a. Provide qualifications of mortar as meeting ASTM C270 at the beginning of the job and whenever mix design is changed.
      b. Mortars will be evaluated during preconstruction and tested during construction for proportioning and compressive strength in accordance to ASTM C780.
   2. Grout: Shall conform to ASTM C476, and will be tested in accordance with ASTM C1019. Compressive strength shall equal or exceed specified compressive strength (*f'm*) at 28 days, but not less than 2,000 psi.
      a. Ready-Mix Grout: Grout manufacturer shall furnish batch ticket information in accordance to ASTM C94.

E. Prism Test: The compressive strength of concrete masonry will be determined by the prism test method prior to the start of construction and during construction in accordance with CBC Section 2105A.2.2.2.

F. Masonry Core Testing: Core testing will be performed in accordance with CBC, Section 2105A.4.

G. Inspection During Installation: A special inspector will continuously observe the installation of reinforced masonry. The IOR shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.

H. The Owner will be responsible for the costs of original tests and inspection.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store units above grade on level platforms or pallets, in a dry location.

B. Store cementitious materials and aggregates in such a manner as to prevent deterioration or intrusion of foreign matter or moisture.

C. Handle units on pallets or flatbed barrows. Free discharge from conveyor units or transportation in mortar trays is not permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Unit Masonry: Modular medium or normal weight conforming to ASTM C90, hollow load-bearing concrete unit masonry. Minimum compressive strength of units shall be 1,900 psi.
   1. Concrete masonry units shall be 10 inch wide by 8 inch tall by 16 inch long.
   2. Provide open-end units at walls to be grouted.

3. Provide closed-end units at walls and at openings where ends will be exposed in finish Work; provide bond beam blocks where horizontal reinforcement is indicated.
4. Provide special shapes and accessory units at locations indicated on Drawings.
5. Provide units in colors and textures as indicated in the drawings.
6. Masonry unit shall have been cured for a minimum of 28 days.
7. Masonry unit shall have maximum liner shrinkage of 0.065 percent from saturated to oven dry.

B. Portland Cement: ASTM C150, Type II, from one source.

C. Hydrated Lime: ASTM C207, Type S.

D. Aggregates: ASTM C144 for mortar and ASTM C404 for grout.

E. Mortar: ASTM C270, Type S, conforming to the property specifications of CBC Table 2103A.8(2).

F. Grout: ASTM C476. Ready-mixed grout shall be manufactured and delivered to the jobsite in accordance to ASTM C94.

G. Admixture for Grout: Grout Aid, as manufactured by Sika Chemical Corp., or equal.

H. Water: Clean, potable, free from substances deleterious to mortar, grout or reinforcement.

I. Reinforcing Steel: Provide and install reinforcing steel in accordance with Specification Section 03200, Concrete Reinforcement.

J. Cleaning Materials: Sure Klean No. 600 detergent by ProSoCo.

K. Miscellaneous Materials: As required to complete the Work.

L. Anchor Bolts: Shall be hex headed bolts conforming to ASTM A307 Grade A with the dimensions of the hex head conforming to ANSI/ASME B18.2.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Discard units with cracks or other defects not complying with requirements of ASTM C 90.

3.2 CONSTRUCTION

A. Construct per applicable provisions of CBC and ACI 530.1.

B. Conform to ACI 530.1 for hot and cold weather masonry construction.

3.3 MORTAR AND GROUT MIXING

A. Mortar: Shall provide a minimum strength of 1800 psi. Dry, loose volumes. Mix proportions will be verified by material testing laboratory.

B. Grout: Shall provide a minimum strength of 2,000 psi or as indicated in the drawings, whichever is higher. Grout space requirements for coarse and fine grouts shall be per Table 7 of ACI 530.1. Add Sika Chemical Corp. Grout Aid per manufacturer's instructions.

C. Measurements: Proportion by accurate volume measurements. Measure in calibrated devices that can be checked at any time.
1. Add water for workable consistency.
2. Shovel measurements are not permitted.

D. Mixing: Mix in accordance to ACI 530.1.
1. Mortar: Mix cementitious materials and aggregates between 3 and 5 minutes in a mechanically operated mixer. Measurement of ingredients shall be by volume. Mix dry ingredients with a sufficient amount of water to provide a workable mix. Batches of less than one sack of cement, and fractional sack batches are not permitted.
2. Factory Blended Mortar: Mix in accordance with manufacturer's recommendations.
3. Grout: Add sufficient water for a workable mix that will flow into all voids of the masonry without separation or segregation. Grout slump shall be between 8 and 11 inches.

E. Re-tempering Time Limit: Use mortar within 2-1/2 hours after mixing. Discard any mortar that has been mixed longer or that has begun to set. If necessary re-temper within this time limit, by replacing only water lost due to evaporation and by thoroughly remixing.

3.4 INSTALLATION OF MASONRY UNITS

A. Workmanship: Install masonry plumb and true to line with straight level joints of uniform thickness. Comply with ACI 530.1 tolerances. Maintain masonry clean during and after installation.
   1. Lay-out and incorporate embedded hardware items.
   2. Assist other trades with built-in items, which require cutting and fitting of masonry.
   3. Cut block units with a diamond saw or carborundum wheel. Trowel or chisel cutting is not permitted.
   4. Keep cavities clear of droppings and debris. Remove droppings prior to grouting.

B. Reinforcing Steel: Install as indicated on Drawings. Except as otherwise indicated, install reinforcement in accordance with standards of Concrete Reinforcing Steel Institute and to requirements specified in Specification Section 03200, Concrete Reinforcement. Do not splice vertical reinforcement except where indicated on the Drawings.

C. Shoring: Provide temporary shoring for lintels with sufficient strength to carry load without deflecting. Remove temporary shoring 28 days after masonry has been installed.

D. Block Installation: Clean dirt and dust from surfaces before installation. Do not wet masonry units.
   1. Foundation preparation: Clean top surface of concrete foundation of dirt, projections and laitance before starting masonry construction.
   2. Install masonry with mortar to required joint thickness. Install blocks with 3/8-inch mortar bed on entire horizontal surface. Fill head joints solid, install tightly to adjoining units. Provide 3/8-inch joint thickness.
      a. Hold racking to a minimum.
      b. No toothing is permitted.
      c. If it becomes necessary to move a unit after it has been installed, remove the unit, discard the mortar, and install the unit in fresh mortar.
   3. Anchor Bolts: Provide one-inch minimum grout space between bolts and masonry.
   4. Bond: Unless otherwise indicated, install units in common running bond.
   5. Finish Joint Treatment: Unless otherwise indicated, cut both interior and exterior joints flush, and tool slightly concave to a dense, uniform surface.
   6. Grouting: Unless noted otherwise on Drawings, completely fill cells with grout.

E. Steel Door Frames:
   1. Locate door frames accurately, install plumb, "Ram-set" or "Rawlplug" to floor surface and brace in position before start of masonry installation.
      a. Frames are specified to be furnished with adjustable anchors.
      b. Fill interior of frames solid with mortar or grout as walls are constructed.
   2. Provide temporary wood spreaders from jamb to jamb and from head to floor to ensure that jambs do not bow-in, distort from a straight line, or deflect from superimposed loads during construction.

3.5 GROUTING

A. Prior to grouting all cells shall be cleaned so that all spaces to be filled with grout do not contain mortar projections greater than 1/4 inch, loose mortar or foreign material.

B. Grout materials and water contents shall be controlled to provide adequate fluidity for placement without segregation of the constituents, and shall be mixed thoroughly. Reinforcement shall be properly positioned and solidly embedded in the grout.

C. The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.

D. Between grout pours, a horizontal control joint shall be formed by stopping all wythes at the same elevation and with the grout stopping at 1-1/2 inches below a mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of 1/2 inch below the top of the masonry.

3.6 LOW-LIFT GROUTING FOR HOLLOW MASONRY UNITS

A. Grouting shall meet the requirements of CBC Section 2104A.6.1.1.2.

B. After mortar joints have set, cells are cleaned of mortar and debris, and reinforcement is installed and inspected, grout cells in 4 feet maximum lifts. Horizontal and vertical reinforcement shall be held in place by suitable devices.

C. Grout may be installed by pump, tremie or bucket, using hoppers to avoid spilling on exposed surfaces.

D. All grout shall be consolidated with a mechanical vibrator after placing so as to completely fill all voids and to consolidate the grout. Grouted walls shall be solid and without voids.

3.7 HIGH-LIFT GROUTING OPTION FOR HOLLOW MASONRY UNITS

A. Grouting shall meet the requirements of CBC Section 2104A.6.1.1.3.

B. High-lift grouting shall apply only to cell sizes available with 8 inch and wider block units.

C. Provide bond beam units, inverted for start course, and omit alternate blocks or remove entire face shell on bottom course for cleanouts.

D. Plug each cleanout by setting a face shell in mortar into opening and securely bracing it in place to prevent displacement. If masonry is not exposed in finish Work, cleanouts may be formed.

E. Grouting: Grouting shall be done in a continuous pour in lifts not exceeding 5 feet in height. The grouting of any section of a wall between control barriers shall be completed in one day, with no interruptions greater than one hour.

F. Consolidating: Grout shall be consolidated by mechanical vibration only, and shall be reconsolidated after excess moisture has been absorbed, but before plasticity is lost. Vibrating of reinforcing steel is not permitted.

3.8 CURING

A. Remove efflorescence, stains, debris, excess grout, and foreign matter.

B. During curing, or for any other purpose, do not saturate masonry with water.

3.9 PARGE COAT

A. Apply parge coat to the earth side of surfaces that are to receive waterproofing.

B. A Portland cement and sand mix (1:3.5 by volume) or Type S mortar may be used for the parge coat.

C. Parging should be applied to damp (not saturated) concrete masonry in two 1/4 inch thick layers. The first coat should be roughened when partially set, hardened for 24 hours, and then moistened before second coat is applied. The second coat should be trowelled to a smooth, dense surface.

D. The parge coat should be beveled at the top to form a wash, and thickened at the bottom to form a cove between the base of the wall and the top of footing.

3.10 CLEANING

A. At completion of masonry Work, remove misplaced mortar, grout or other foreign substances, and clean surfaces which will be exposed in finish Work with specified cleaner, or with clean water and stiff fiber brushes.

B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.11 PROTECTION

A. Protect the Work of this section until Substantial Completion

END OF SECTION

SECTION 042203

CMU PARGING

PART 1 - GENERAL

1.1 SUMMARY

A. Products Furnished But Not Installed Under This Section:

B. Related Sections:
   1. Section 042200 – Concrete Unit Masonry.

1.2 FIELD SAMPLES

A. General: Comply with provisions of Section 014500.

B. Sample Installation:
   1. Construct field sample 6 feet long by 4 feet high.
   2. Locate on site where directed.
   3. Show construction techniques and finish texture.

PART 2 - PRODUCTS

2.1 MORTAR AND GROUT MATERIALS

A. Proprietary Masonry Cement: Not permitted.

B. Portland Cement: ASTM C150, normal-Type I; gray color.

C. Hydrated Lime: ASTM C207, Type S.

D. Mortar Aggregate: ASTM C144, except graded to pass No. 16 sieve for joints 1/4 inch or less.

E. Water: Clean and drinkable.

2.2 MORTAR

A. Mortar:
   1. ASTM C270 using Proportion Method or BIA M1 Proportion Method.
   2. Limit cementitious materials to portland cement and hydrated lime.
   3. Type S or N.

B. Site Mixed Mortar: Combine and thoroughly mix cement, aggregates, and water in mechanical batch mixer. Use proportion measuring method to ensure accuracy and consistency; shovel method is not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

3.2 PARGING

A. Parge predampened masonry walls, where indicated, with Type S or Type N mortar applied in 2 uniform coats to a total thickness of 3/8 inch. Scarify first parging coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp cure parging for at least 24 hours and protect until cured.

END OF SECTION

DIVISION 05

METALS

SECTION 050650

WELDED STUD CONNECTORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section covers the technical requirements for welded stud connectors and forms a part of all other Sections which require stud connectors, anchor studs, stud shear connectors, and similar items to be provided in accordance with this Section.

B. Related Work Specified Elsewhere:
   1. Specification Section 051200.
   2. Specification Section 053150.

1.2 SUBMITTALS

A. Product Data: Submit following items for information only if requested; however, maintain copies of the following readily available at the site whenever welded stud connectors are being installed:
   1. Certified evidence stud bases are qualified in accordance with Building Code.
   2. Copies of Building Department approvals for all studs, stud bases, and arc shields.
   3. Stud manufacturer's installation instructions with a complete listing, by manufacturer and model, of stud welding equipment approved by stud manufacturer.

1.3 QUALITY ASSURANCE

A. Furnish studs and stud bases currently qualified in accordance with Building Code, and install in accordance with the procedures conforming to procedure qualification tests and research reports approved by the Owner’s Representative. Employ welding mechanics skilled and experienced in installing the required studs and who are currently qualified.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

1. Protect materials from damage during shipping, handling, and storage at the site. Deliver studs to site in unbroken sealed packages bearing manufacturer's name and label identifying the contents.

PART 2 - PRODUCTS

2.1 STUD CONNECTORS

A. Standard product steel stud units intended for welding by automatically timed stud-welding equipment, furnished complete with an arc shield (ferrule) of heat-resistant ceramic or equivalent for all studs and, for studs 5/16" diameter or larger, a deoxidizing and arc stabilizing flux; no studs painted, galvanized, or cadmium plated prior to welding and all finished by cold heading, cold rolling, or machining; all of uniform quality and condition, free of injurious laps, fins, seams, cracks, twists, bends not indicated, rust, rust pits, scale, oil, or other injurious defects or substances.

B. Stud Steel: Furnish end-welding studs manufactured of steel conforming to ASTM A108, C-1010 through C-1020 cold-drawn steel of minimum 60,000 psi tensile strength with 20% elongation in 2" and 50% area reduction.

C. Manufacturer: Nelson Stud Welding of TRW Nelson Division, KSM Division of Omark Industries, or approved equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that galvanizing on steel deck does not exceed the zinc coating approved for stud installation. Report in writing all conditions that prevent or interfere with the proper installation of studs including loose steel decking or improper fitting

3.2 PREPARATION

A. Cleaning: Clean surfaces to receive the studs of paint, scale, rust, and other injurious substances by wire brushing, peening, prick-punching, grinding, or other method as required to produce clean bare substrates.

B. Preparation for Replacement Studs and Repairs: Repair steel surfaces as follows wherever a defective stud is removed. Make area where a stud is removed flush and smooth if the surface remains exposed in the Work. Complete repairs before installing a replacement stud on a defect area.
   1. Areas Subject To Tensile Stress: Make the area flush and smooth. If the base metal is pulled out by stud removal, fill pocket by shielded metal-arc welding conforming to AWS D1.1 using low-hydrogen electrodes, and grind the weld surfaces flush.
   2. Areas Subject To Compression: Where any stud failures are confined to shanks or fusion zones of the studs, a new stud may be installed adjacent to the defective area in lieu of repairing defective area and installing a replacement stud, subject to approval. If metal is pulled out of base metal, fill pocket as specified above for tensile stress areas except, if the defect depth is not more than the lesser of 1/8" or 7% of base metal thickness, the defect may be faired by grinding in lieu of weld filling.

3.3 STUD WELDING

A. Conform to Building Code and Owner's Representatives approvals, approved submittals, and requirements herein.

B. Welding Equipment: Furnish automatically timed stud-welding equipment and a suitable power source, of type and manufacturer listed as approved by the stud manufacturer. Interlock the welding equipment supplying current to two or more stud-welding guns so that only one gun can operate at a time and so power source has fully recovered from making one weld before another weld is started.

C. Installation: Do not install studs on wet surfaces, nor any studs showing defects, rust, rust pits, scale, oil, or other deleterious substance. Hold the steel decking tight to the supports prior to stud installation. Install studs promptly after cleaning and preparation. Hold welding gun in correct position and without movement until the weld metal has solidified. Break and remove arc shields after welding. Produce welded studs free from any defect or substance that interferes with intended functions.
   1. Placing Locations: Singly space shear stud connectors along the beam with excess double studs spaced symmetrically from each end of the beam. Place adjacent studs on centers not closer than 3" transversely and not closer than 4-1/2" longitudinally, on centers. Provide minimum distance between edges of the shear stud bases and flange edges equal to the stud diameter plus 1/8", but minimum 1-1/2" clearance wherever possible. Location accuracy of other types of studs shall permit the assembly of attachments without alterations or reaming.
   2. Stud Lengths: Stud lengths indicated or noted are minimum acceptable net lengths after welding. If reduction in length of a stud as it is welded is such that length of the stud is more than 1/16" greater than that specified by stud manufacturer, discontinue stud installation until the cause is determined and eliminated and pre-production testing is satisfactorily repeated.
   3. Defective Fillets: Any stud not showing a full 360 degree weld fillet after welding may be repaired by welding a 3/16" fillet weld in lieu of missing weld fillet in accordance with AWS D1.1 using low-hydrogen electrodes.

D. Studs On Metal Decking: Exercise extreme care to prevent defective welds or damage to or excessive burning of decking when welding through metal decking.

3.4 FIELD QUALITY CONTROL

A. Inspection: Provide pre-production testing, welded stud installation, and production inspection and testing under continuous inspection of the Owner's Independent Testing/Inspection Laboratory Welding Inspector. In addition to standard reports, Welding Inspector's reports shall detail the location of all defective studs with the repair or replacement action taken, damage resulting from the stud installation, and all defects and unusual occurrences.

B. Exception: Inspection and testing is waived for the studs connecting only non-structural and non-stressed finish materials.

C. Pre-Production Testing: The following tests are required for each welding equipment power source at start of each production period (time interval from start-up to any shutdown of any stud-welding equipment), at the start of any new welding procedure, and after any change in the welding procedure.
   1. Pre-Production Tests - Stud Shear Connectors: After cooling, test the first 2 studs on a member by hammer bending to a 45 degree angle. If failure occurs in the weld zone of either stud, correct the procedure, and weld and bend test 2 more studs on the member. If either of the second 2 studs fails, continue additional welding on separate materials until 2 consecutive studs are tested and found satisfactory. Then weld 2 studs to the same member, bend test, and find satisfactory before any more studs are welded to the member.
   2. Pre-Production Tests For Studs Other Than Shear Connectors: Weld two studs to separate material in the same general position (such as flat, vertical, sloping, or overhead) and of similar steel material and thickness as members to receive studs. After cooling, hammer bend the studs to a 30 degree angle. If failure occurs in any stud shank, ascertain and correct the cause before making further welds. If failure occurs in the weld zone of either stud, correct the procedure and successfully weld and test 2 successive studs before any studs are welded to members.

D. Production Inspection and Testing
   1. Inspection of Stud Shear Connectors: After cooling, test at least one stud on each steel member by hammer bending to a 15 degree angle, or test each stud by striking twice with a 6 lb. hammer to verify that quality welds are obtained. If failure occurs either in weld zone or stud shank, follow method of correction as required herein for pre-production testing until successful installations are produced, and replace all defective studs. Test all those studs (a) not showing full 360 degree fillet weld or (b) are repaired by welding, (c) replacement studs, and (d) in which the reduction in length is less than correct by hammer bending to a 15 degree angle. For studs showing less than a 360 degree weld fillet, bend the stud in the direction opposite to missing fillet metal. Remove and replace studs that crack in the weld zone, base metal, or the shank under inspection and testing or under subsequent straightening.
   2. Stud Inspection Other Than Shear Connectors: Test not less than one stud in every 100 studs by hammer bending to a 15 degree angle or, if threaded, torque test with a calibrated torque wrench to an approved value for stud diameter and thread in an approved device. If the stud fails, correct the welding procedure as required herein for pre-production testing and bend or torque test 2 more in-place studs. If either of the 2 second studs fails, all studs represented by the tests shall be bend or torque tested, or shall be rejected and replaced. Extent of additional inspection and testing for critical structural connections shall be as required by Owner’s Representative and Owner’s Representative’s Consultant.

E. Straightening: Leave in a bent condition those stud shear connectors and shear transfer devices that are bent less than 16 degrees and are free of any failure provided no part of studs is within 1" of an exposed concrete surface. Perform stud bending and straightening without heating and before the completion of each day's welding operations. Obtain inspection and approval of straightened studs before covering.

F. Load Testing: Testing Laboratory shall load test studs to the extent and by the methods directed.

END OF SECTION

SECTION 051200

STRUCTURAL STEEL FRAMING

(LANDMARK BUILDING)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members, support members.

B. Base plates.

C. Grouting under base plates.

1.2 REFERENCE STANDARDS

A. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc.; 2005.

B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2005.

C. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts; 2004.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2008.

E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

F. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2007.

G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.

H. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

I. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2004 (Reapproved 2009).

J. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2010.

K. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.

L. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2009.

M. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use; 2010.

N. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 ksi Minimum Tensile Strength; 2012.

O. ASTM A490M - Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric); 2012.

P. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2010a.

Q. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2007.

R. ASTM A514/A514M - Standard Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 2005 (Reapproved 2009).

S. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2005 (Reapproved 2009).

T. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a.

U. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2007.

V. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2012.

W. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point with Atmospheric Corrosion Resistance; 2010.

X. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011.

Y. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2012.

Z. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability; 2012.

AA. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2011.

AB. ASTM E94 - Standard Guide for Radiographic Examination; 2004 (Reapproved 2010).

AC. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments; 2008.

AD. ASTM E165 - Standard Test Method for Liquid Penetrant Examination; 2009.

AE. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2008.

AF. ASTM F436 - Standard Specification for Hardened Steel Washers; 2011.

AG. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 2009.

AH. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2007a.

AI. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2007.

AJ. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.

AK. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

AL. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).

AM. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

AN. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.3 SUBMITTALS

A. See Section 01 30 00 (01300) - Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Connections not detailed.
3. Indicate cambers and loads.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified by City of Los Angeles

1.4 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC "Steel Construction Manual."

B. Comply with Section 10 of AISC "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

C. Maintain one copy of each document on site.

D. Fabricator: Company specializing in performing the work of this section with minimum 5 years of documented experience.

E. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.

F. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Angles and Plates: ASTM A36/A36M.

B. Steel W Shapes and Tees: ASTM A992/A992M.

C. Steel Shapes, Plates, and Bars: ASTM A 242/A 242M high-strength, corrosion-resistant structural steel.

D. Steel Shapes, Plates, and Bars: ASTM A529/A529M high-strength, carbon-manganese structural steel, Grade 50.

E. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.

F. Cold-Formed Structural Tubing: ASTM A500, Grade B.

G. Hot-Formed Structural Tubing: ASTM A501, seamless or welded.

J. Pipe: ASTM A53/A53M, Grade B, Finish black.

K. Shear Stud Connectors: Made from ASTM A 108 Grade 1015 bars.

M. Tension Rods: ASTM 1554 Grade 105.

N. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A galvanized to ASTM A

153/A 153M, Class C.

O. High-Strength Structural Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, medium carbon, galvanized.

P. High-Strength Structural Bolts: ASTM A490 (ASTM A490M), with matching ASTM A563 (ASTM A563M) nuts and ASTM F436 washers; Type 1 alloy steel.

Q. Unheaded Anchor Rods: ASTM F1554, Grade 55, plain, with matching ASTM A563 or A 563M nuts and ASTM F436 Type 1 washers.

R. Load Indicator Washers: Provide washers complying with ASTM F959 at all connections requiring high-strength bolts.

S. Welding Materials: AWS D1.1; type required for materials being welded.

T. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C1107/C1107M and capable of developing a minimum compressive strength of 7,000 psi at 28 days.

U. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

V. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

C. Fabricate connections for bolt, nut, and washer connectors.

D. Develop required camber for members.

2.3 SOURCE QUALITY CONTROL

A. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 25 percent of bolts at each connection.

B. Welded Connections: Visually inspect all shop-welded connections and test at least 25 percent of welds using one of the following:

1. Radiographic testing performed in accordance with ASTM E94.
2. Ultrasonic testing performed in accordance with ASTM E164.
3. Liquid penetrant inspection performed in accordance with ASTM E165.
4. Magnetic particle inspection performed in accordance with ASTM E709.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".

B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Field weld components indicated on shop drawings.

D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

E. Do not field cut or alter structural members without approval of Owner's Representative.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.3 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 (01400).

B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 33 percent of bolts at each connection.

C. Welded Connections: Visually inspect all field-welded connections and test at least 33 percent of welds using one of the following:

1. Radiographic testing performed in accordance with ASTM E94.

2. Ultrasonic testing performed in accordance with ASTM E164.

3. Liquid penetrant inspection performed in accordance with ASTM E165.

4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

SECTION 051200

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural steel framing.
   2. Steel pipe and tube framing.
   3. Shop priming and field touch-up to extent specified.
   4. Hoisting of metal floor and roof decking.

B. Related Work Specified Elsewhere:
   1. Setting of anchor bolts and inserts in concrete.
   2. Metal decking installation.
   3. Reinforcing steel.
   4. Fireproofing for structural steel.
   5. Field painting except as specified herein.
   6. Miscellaneous metal fabrications including steel stairs.

1.2 REFERENCES

A. AISC Standards: Code of Standard Practice for Steel Buildings and Bridges; Specification for the Design, Fabrication and Erection of Structural Steel for Buildings; and Steel Construction Manual; as amended by Building Department.

B. AWS Standards: AWS D1.1, Structural Welding Code.

1.3 SUBMITTALS

A. Product Data: Submit copies of producer's or manufacturer's data and installation instructions for the following products. Include laboratory test reports and other data required to show compliance with these specifications:
   1. Structural steel, including certified copies of mill test reports covering chemical and physical properties.
   2. Unfinished bolts and nuts.
   3. High strength bolts, including nuts and washers.

B. Shop Drawings: Submit covering all structural steel including welding, accessories, and fastenings. Fully detail minor connections and fastenings not shown or specified to meet required conditions. Include detailed sequence plan for shop and field welding that minimizes locked-in stresses and distortion.

1.4 QUALITY ASSURANCE

A. Qualifications of Fabricator: Fabricate structural steel in shop of a licensed fabricator approved by AISC and Governing Code Authority (if Governing Code Authority does not certify fabricators, fabricator shall be approved by the City of Los Angeles).

B. Requirements of Regulatory Agencies: Work of this section shall conform to Code.

C. Source Quality Control:
   1. Identified mill order steel: If steel can be identified by heat and melt numbers, and is accompanied by mill analyses and test reports, commercial stock may be used without physical testing. Submit an affidavit attesting to compliance in accord with the Specifications. Comply with Title 24, 2712 (a).
   2. Identified local stock steel: For hot-rolled structural steel shapes, plate and tube required to meet a minimum specified yield not exceeding 36,000 psi, mill analyses and test reports certified by the manufacturer may constitute sufficient evidence of conformity with specifications provided materials can be identified in fabricating shop in accord with ASTM A36, by a qualified representative of an independent testing laboratory. When in compliance with these conditions, physical testing will not be required.

3. Unidentified Structural Steel:
   a. When material required to meet a minimum specified yield of 36,000 psi cannot be identified or its source is questionable, make one set of tension tests and one set or bend tests for each 20 tons or fractional part thereof of each heat. Additional tests may be ordered when deemed necessary.
   b. When material required to meet a minimum specified yield greater than 36,000 psi cannot be identified or its source is questionable, make one set of tension tests and one set of bend tests for each piece.
4. High Strength Bolts: Furnish certified copy of manufacturer's test reports stating that high strength bolts and heat-treated steel structural bolts meet the requirements of ASTM A325 and ASTM A490, respectively.
   a. Testing laboratory shall take samples and test not less than 3 samples including nuts, bolts and washers from each lot and each size of each lot.

D. Erection and Bracing Plan and Procedure: Refer to Section 1710, Title 8, CCR, and Building Code. Employ and pay a California registered civil engineer to prepare an erection and bracing plan and erection procedure for structural steel including columns, beams, and girders, who shall be solely responsible for its compliance. Follow the plan and procedure exactly. Keep a copy at the job site as required by California Division of Industrial Safety. File 2 copies of stamped erection and bracing plan and procedure for record purposes only, not for review or approval.

1.5 PRODUCT DELIVERY AND HANDLING

A. Delivery and Handling: Protect all materials from damage during shipping, handling and storage on the site. Steel showing dents, creases, deformations, weathering, or other defects is not acceptable.

B. Welding Electrodes: Deliver to the site in unbroken packages bearing the manufacturer's name and label identifying the contents.

1.6 PROJECT SITE CONDITIONS

A. Site Measurements: Take field measurements of embedded plates and connection elements installed by others. Report any major discrepancy between drawings and field dimensions. Survey control points as indicated on drawings for record.

B. Protection of Floors: Use caution to protect floor slab and adjacent work from damage. Do not overload floors. Use rubber tired equipment to handle and move steel. Do not place steel members directly on floor; use pads of timber or like material for cushioning.

C. Temporary Flooring: Provide necessary temporary planking, scaffolding, and flooring for erection of structural steel or support of erection machinery. Conform use of temporary floors or steel decking to code.

D. Connection of Steel Decking Temporary Flooring: Temporarily weld steel decking to supports where used as a working platform. Distribute concentrated loadings from welding machines and other heavy machinery with planking or equal. Replace decking damaged by use as a working platform at no additional contract cost.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel shapes: A992, Grade 50, unless noted otherwise on drawings.

B. Steel pipe: ASTM A53, Type E or S, Grade B.

C. Structural tubing: Hot-formed, ASTM A501. Cold-formed, ASTM A500, Grade B. Fy=46KSI.

D. Machine bolts and nuts: ASTM A307, Grade A.

E. High strength bolts, nuts, and washers: ASTM A325.

F. Anchor Bolts: ASTM F1554, Grade 36 or as noted on drawings.

G. Heat treated steel structural bolts, 150 ksi minimum tensile strength: ASTM A490.

H. Welded stud connectors: Conforming to Section 05065.

I. Welding electrodes:
   1. Carbon steel covered arc welding electrodes for A36 steels: AWS A5.1, E70XX Series, low hydrogen, having a minimum yield point of 60,000 psi.
   2. Electrodes and fluxes for submerged arc welding: AWS A5.17, E70XX Series.
   3. Gas-shielded arc welding: AWS A5.18.
   4. Flux-cored arc welding: AWS A5.20.

J. Primer: Use types acceptable to governing air quality management officials.
   1. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers", including 2004 Addenda.
   2. For above-grade locations: Lead free metal primer, Tnemec 10-99 or Rust-Oleum X-60.
   3. For below grade applications: Coal-tar epoxy coating, two coats, 5 mils per coat. Perma Bar, as manufactured by Karlee Co., Burbank, CA, tel: (213) 843-4766, or equal. Touch-up on job site with Perma-Bar coal-tar epoxy, match finish coat thickness.

K. Non-shrink grout: Conform to requirements of Section 033000.

2.2 FABRICATION

A. Fabricate structural steel in accordance with the approved submittals, reference standards as applicable, and requirements herein. Fabricate and form the work to meet actual installation conditions verified at the site.

B. Cleaning and Straightening: Thoroughly wire brush material, clean of loose mill scale and rust, and straighten by methods that will not injure the steel prior to fabrication. Remove twists or bends after punching or working component parts of a member before the parts are assembled. Produce finished members free from twists, bends, and open joints when erected.

C. Contact: Pin components parts of built-up members and maintain in close contact using clamps or temporary bolting during welding operations. Accurately mill compression bearing surfaces of joints depending on contact bearings or saw cut square to axis, or as detailed. Cut other joints straight and true.

D. Joining: Provide members of the sizes, weights, shapes, and arrangements indicated, closely fitted and finished true to line and in precise position as necessary to allow proper joining of parts in the field. Drifting to enlarge unfair holes is not allowed without prior approval.

E. Drilling, Punching, and Reaming: Hole burning to make or enlarge previous holes is allowed only with prior approval. Prepare required holes in structural steel members for attachment or passage of work of other trades. Precisely locate finished holes to ensure passage of all bolts through steel assemblies without drifting. Enlarge holes only by reaming. Poor matching of holes is cause for rejection.

F. Holes For Anchor Bolts: Punch and drill or ream holes in base and bearing plates. Do not make or enlarge the holes by burning except for grouting holes in column bases.

G. Base Plates: Press or mill steel column base plates 4" thick or less for straight contact bearing between plate and column.

H. Gas Cutting: Use of a cutting torch is allowed where the metal being cut is not stressed during the operation, and provided stresses are not transmitted through a flame-cut surface. Make all gas cuts with a smooth regular contour. Deduct 1/8" from width of gas cut edges to determine effective width of members that are gas cut. Make radius of reentrant gas cuts as large as possible, but 1" minimum.

2.3 CONNECTIONS

A. Make connections with common bolts unless otherwise shown.

B. High-Strength Steel Bolting: For joints connected by high strength steel bolts, hardened washers, and nuts tightened to high tension, conform materials, method of installation and tension control, type of wrenches, and inspection to the reference standards and the following requirements:
   1. High-strength bolts shall have a suitable identifying mark placed on top of the head at the factory.

2. Tightening of nuts shall be done with calibrated wrenches or by the turn of the nut method. Minimum bolt tension for the size of bolt used shall conform to tables listed in reference standards.
3. Calibrated wrenches shall be checked individually for accuracy at least once daily for actual conditions of application.
4. Fully tightened bolts shall be marked with identifying symbol.
5. Hardened washers shall be installed in accordance with AISC standards.
6. Clean all contact surfaces of bolted parts and threads free of scale, slag, burrs, and pits, as well as dirt and foreign materials which would prevent solid seating of parts.
7. Bolt lengths shall equal the grip plus 1-1/4”.
8. Install all high-strength bolts under inspection required by Title 24 CCR, 2712(f).

C. Welded Stud Connectors: Conform to requirements of Section 050650.

D. Load Indicator Washers: As manufactured and licensed by Cooper and Turner, Bethlehem Steel, or approved equal, may be used for the field installation of the high-strength bolts. Load indicator washers may not be substituted for any required washer, but may be used in conjunction with the required washers. Conform tightening to Paragraph 5e of the Reference Standard. After sufficient bolts in a joint are snugged to bring the members into close contact, tightening shall progress from the most rigid part to the free edges until the load indicators on all bolts are closed to the required gap of 0.015" under bolt heads or 0.010" under the nuts. Do not completely close the gap to prevent overtightening and damage to the bolts.

E. Tension Set or Load Indicator Bolts, Nuts, and Washers: As manufactured by Cold Form Specialties, Bethlehem Steel, or approved equal, may be used for field installation of the high-strength bolts. In multi-bolt joints, the nuts shall be tightened in stages (a little at a time) without breaking the spline in any of them until the final stage, to minimize slackening of the installed bolts.

2.4 WELDING

A. Conform to AWS D1.1, as modified by referenced AISC Standards, and as indicated or noted on the Drawings. Employ certified welding operators who are thoroughly trained and experienced in arc welding and produce uniformly reliable groove and fillet welds in flat, vertical, and overhead positions, and make neat and consistent welds. Weld structural steel joints by the shielded electric-arc method unless otherwise shown or specified. Provide inspection and testing of welds as required under Article "Field Quality Control" hereinafter.

B. Weld Finishing: Grind exposed welds subject to contact to smooth surfaces free of holes, slag, or other defects, flush with the adjoining surfaces. No finish treatment is required for permanently concealed welds and other exposed welds.

C. Storage and Care of Electrodes: Coatings of low-hydrogen type electrodes shall be thoroughly dry as used. Conform to UBC Std. 27.607(a); use electrodes as taken from hermetically sealed packages within time limit specified therein after package is opened. Electrodes not used within allowable time period and electrodes that have been exposed more than one hour to air having a relative humidity of 75% or greater shall be dried according to UBC Std. 27.607(a) before they are used, or shall be reconditioned according to electrode manufacturer's recommendations. Electrodes so dried or reconditioned not used within allowable time period after drying is completed shall be redried before use. Electrodes of any class that have been wet shall not be used under any conditions.

D. Preparation: Clean steel surfaces to be welded of paint, grease, oil, mill scale, and foreign matter. Clean weld each time the electrode is changed. Chip full surface of hand guided and controlled flame cut edges before welding. Surfaces prepared with automatic or mechanically guided and controlled equipment need not be ground or chipped before welding.

E. Shop Ultrasonic Testing: Ultrasonically test all column materials greater than 1-1/2" in thickness for laminations within 12” (6” on each side) of direct groove welds from column splices and girder flange connections prior to welding. Conform to ultrasonic testing procedures specified under "Field Quality Control", hereinafter.

F. Procedures: During assembling and welding, hold components of a built-up member with adequate clamps or other means to keep parts straight and in close contact. Do no welding in wind until adequate protective screening is set up. Cut out defective welds or parts of welds with a chisel or air arc and replace.

G. Weld Characteristics: Clean and wire brush all welds. Visual inspection of finished welds must show uniform section, smoothness of welded metal, feather edges without undercuts or overlays, freedom from porosity and inclusions, and good fusion and penetration into base metal at edges and ends of fillet welds.

H. Lamination Checking: Prior to welding, ultrasonically test column materials greater than 1-1/2" in thickness for lamination within 12" (6" on each side) of a direct groove weld from column splices and girder flange connections. Conform to the ultrasonic testing procedures specified under "Field Quality Control" hereinafter.

2.5 SHOP PRIMING

A. Clean surfaces according to AISC Specifications. Apply one shop coat of specified metal primer to minimum 1.0 mil dry film thickness. Work primer into joints. Do not prime the following:
   1. Steel surfaces embedded in concrete or masonry.
   2. Contact surfaces of high-strength bolted connections.
   3. Surfaces to receive directly adhered fireproofing.

PART 3 - EXECUTION

3.1 ERECTION OF STRUCTURAL STEEL

A. Brace and secure structural steel members until permanent connections are completed. Provide accessories and fasteners to secure steel in place as shown and required. Conform to Code, AISC Standards, and erection and bracing plan and procedure.

B. Employ qualified riggers and plan erection to require minimum cutting. Erect members plumb, true to line and level, and in precise positions. Provide temporary bracing and guying to resist loads and stresses to which the structure may be subjected, including those due to erection equipment and its operation.

C. Damaged Members: During erection, straighten or replace members which are bent, twisted, or damaged as directed. If heating is required, perform heating by methods that ensure a uniform temperature throughout the entire member. When directed, remove members damaged to an extent impairing appearance, strength, or serviceability and replace with new members at no extra cost to the Owner.

D. Anchor Bolts: Furnish and deliver anchor bolts with setting drawings and templates. Verify position of bolts prior to delivery of steel; report errors or deviation for correction.

E. Steel Columns: Set column bases in exact position for alignment, plumb and straight, supported on adjustable bolt supports or shims until grout has set. Set center of base true to column center within 1/16" and adjust column height exactly. Maintain bases at exact position and level during grouting. Fill grout space solid with non-shrink grout.

F. Connections: Hold steel in correct position during welding and bolting, and provide for dead loads, wind, and all erection stresses. Do no welding or final bolting until members have been aligned and plumbed.
   1. Field Welding: Conform to requirements for shop fabrication.
   2. Common Bolts: Tighten and upset bolt threads to preclude loosening, or use approved self-locking nuts.
   3. High-Strength Bolting: Tighten by turn of the nut method or with calibrated torque wrenches as specified for the shop high-strength bolting and according to Code, AISC Standards and the Reference Standard.
   4. Welded Stud Connectors - Site Installed: Field install welded stud connectors in accordance with Section 05065.

G. Tolerances: Erect members to the tolerances conforming to referenced AISC Standards and Code, and as follows:

1. Vertical Dimensions: Measured from top of beams at their connection at any column, variation not more than 1/4" plus or minus per story or, when variations are accumulative from floor to floor, not exceeding 3/8" per story exclusive of column shortening due to dead load.
2. Plumb Displacement: Center line of columns from established column line, not more than 1" toward or away from established center line.
3. Floor Elevation: Floor elevation will be considered level if floor framing members on any one floor, measured from top of column connections, do not vary more than 1/2" plus or minus.
4. Horizontal Dimension Variances: Governed by specified column plumb displacement.

3.2 FIELD TOUCH-UP PAINTING

A. After structural steel erection and connections are completed and approved, clean all connections to be painted and damage to shop painted surfaces, and apply a field touch-up coat of same metal primer used for shop coat.

3.3 FIELD QUALITY CONTROL (Contractor to retain and pay for the inspection and testing services):

A. Inspection: According to Reference Standards. Inspector shall visually inspect welds, shall be present to inspect and approve all groove and penetration welding, and shall inspect all erection including the grouting under base plates.

B. Tests of Welding and Bolting: Testing Laboratory shall inspect all shop and field welding, conform to requirements of code and ICC, and certify in writing, after completion of work, that welding has been performed in accordance with the drawings, specifications, and code.

C. Inspection of High-Strength Bolts: Testing Laboratory shall check bolt tightness on a minimum of 10% of the bolts, selected at random, for each high-strength bolted joint. Inspection procedure shall conform to the reference standard.

D. Inspection and Testing of Welded Stud Connectors: According to section 05065, including pre-production testing and production inspection and testing.

E. Full Penetration and Groove Weld Inspection: Testing Laboratory shall inspect full penetration and groove welds for connections of column to column, column to girder, girder to girder, and similar connections by ultrasonic testing or other approved non-destructive tests. Conform to Owner Representative's requirements for reinspection of the welds after installation.

F. Ultrasonic Testing: Testing Laboratory specially trained and fully qualified technician shall operate ultrasonic testing equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. All defective welds shall be repaired and costs for retesting defective welds shall be paid by the Contractor.
   1. Rate of Testing: Test welds requiring ultrasonic testing at 100%. No reduction in testing rate will be permitted.
   2. Backing Strips: Remove backing strips whenever ultrasonic indications arising from weld roots can be interpreted as either a weld defect or a backing strip, and retest weld if no root defect is visible. If no defect is disclosed by retest and no significant amount of the base and weld metal is removed, joint needs no further repair or welding. Repair all defects disclosed. Contractor shall bear the cost of removals and repairs.
   3. Questionable Root Indications: Root indications that prove not to be defective welds shall not count against the welder to increase the test rate.
   4. Ultrasonic Instrumentation: Calibrated by technician to evaluate the quality of the welds in accordance with AWS D1.1, Sections 5 and 6.

END OF SECTION

SECTION 053100

STEEL DECKING

(LANDMARK BUILDING)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roof deck.

B. Composite floor deck.

C. Supplementary framing for openings up to and including 18 inches.

D. Ledger angles.

E. Stud shear connectors.

1.2 RELATED REQUIREMENTS

A. Section 03 20 00 - Concrete Reinforcing.

B. Section 03 30 00 - Cast-in-Place Concrete: Concrete topping over metal deck.

C. Section 05 12 00 - Structural Steel Framing: Support framing for openings larger than 18 inches and shear stud connectors.

D. Section 05 12 50 – Special Requirements for Architecturally Exposed Structural Steel

1.3 REFERENCE STANDARDS

A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.

B. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2007.

C. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2007.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2008.

F. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 2007.

G. SDI (DM) - Publication No.31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute; 2007.

H. SSPC-Paint 15 - Steel Joist Shop Primer; The Society for Protective Coatings; 1999 (Ed. 2004).

I. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings; 2002 (Ed. 2004).

J. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings; 1997 (Ed. 2004).

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.

1. Shop drawings shall not be a reproduction of the construction documents.

C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.

D. Certificates: Certify that products furnished meet or exceed specified requirements.

E. Submit manufacturer's installation instructions.

F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Deck:

1. Verco Manufacturing Company; Product as indicated on the drawings.

2. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 STEEL DECK

A. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 33/230, with G60/Z180 galvanized coating.

2. Structural Properties:

a. Section modulus: As indicated in the drawings.

3. Minimum Metal Thickness, Excluding Finish: gage as indicated in the drawings.

4. Nominal Height: As indicated in the drawings.

2.3 ACCESSORY MATERIALS

A. Bearing Plates and Angles: As indicated in the drawings, unfinished.

B. Welding Materials: AWS D1.1.

C. Shop and Touch-Up Primer: SSPC-Paint 25, zinc oxide, complying with VOC limitations of authorities having jurisdiction.

D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

E. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

2.4 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage, profile and size as indicated in the drawings; finished same as deck.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. Provide minimum 1-1/2 inch bearing at supporting members parallel to deck flutes and 2 inch bearing at supporting members perpendicular to deck flutes.

C. Fasten deck to steel support members at ends and intermediate supports as indicated on the drawings.

D. Fasten side seams and as indicated on the drawings.

E. Weld deck in accordance with AWS D1.3.

F. Provide deck support at openings as indicated in the drawings.

G. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.

H. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.

I. Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

J. Weld stud shear connectors through steel deck to structural members below.

K. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

SECTION 053150

METAL FLOOR AND ROOF DECK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Steel floor and roof deck with accessories.
   2. Bent plate and sheet metal closures at decking edges and openings.
   3. Holes through decking, with reinforcing.
   4. Welded shear studs for floor deck.

B. Related Work Specified Elsewhere:
   1. Hoisting of decking.
   2. Structural steel framing and supports for steel decking.
   3. Structural concrete fill on steel floor and roof deck.

1.2 SUBMITTALS:

A. Shop Drawings: Submit fully detailing and dimensioning all steel decking including accessories, fastenings, welding, holes with reinforcing, flashings, and closures. Indicate welding according to AWS Standard Welding Symbols. Show dimensioned layouts for openings and reinforcing details.

B. Calculations and Data: If steel decking of type differing from that indicated or specified is proposed, submit the manufacturer's calculations and supporting data showing that proposed decking conforms to requirements indicated and specified. Include the decking manufacturer's technical product data and copies of code approvals for proposed decking. Submit with shop drawings and obtain approval prior to fabrication and delivery of decking.

1.3 QUALITY ASSURANCE:

A. Qualifications of Welders: Employ welding operators currently tested and certified in accordance with code.

B. Requirements of Regulatory Agencies: Provide steel floor and roof deck system that, with concrete fill (and sprayed fireproofing where indicated), meets UL and code requirements for 3 hour fire-rated deck system (first floor), and 1 hour fire-rated deck system (second floor).

C. Source Quality Control: Furnish the decking manufacturer's certified mill analyses and test reports covering all decking.

PART 2 - PRODUCTS

2.1 DECKING MATERIALS:

A. Furnish metal roof decking having galvanized coating conforming to ASTM A924, Class G60. Decking shall be fabricated of steel conforming to ASTM 653-SS, Grade 33 (minimum), minimum yield 33,000psi, unless otherwise noted. Provide vented deck where indicated on drawings.

B. Roof Decking: Type and manufacture noted on the drawings, lengths to span over at least 3 supports unless otherwise shown, each panel factory slotted or having rolled-in moisture venting provisions.

C. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Composite Floor Deck: Type and manufacture noted on drawings, lengths to span over at least three supports unless otherwise indicated, manufactured from ASTM A653-SS Grade 33 (minimum) steel.

E. Decking Accessories: Provide indicated and required decking accessories including, without limitation, welding washers and welding anchors, closures, transitions, and filler strips, as required for complete installations. Provide bent plate closures, angles, channels, and attachments as required for openings through decking for ducts, shafts, piping, and other penetrations; where decking changes direction; and at decking perimeter; fabricated of 16 gage galvanized steel unless otherwise shown. Provide roof drain and overflow sumps of minimum 14 gage galvanized steel.

F. Galvanizing Repair Paint: Zinc rich paint conforming to Mil Spec MIL-P-21035 (SHIPS).

G. Welded Stud Shear Connectors: As specified in Section 050650.

PART 3 - EXECUTION

3.1 INSTALLATION OF DECKING: Verify dimensions and actual site conditions to ensure proper fit and installation.

A. Placing: Place steel decking on supports with full bearings, end joints centered over supports, and adjust to correct final position before completing permanent attachments. Place units in straight alignment for the entire length of run of flutes with close registration of flutes and with maximum 1/8" gap between ends of units, minimum 2" bearing on the supports. Do not splice units except at supports. Conform to code approvals and approved submittals.

B. Cutting and Fitting: Perform cutting and fitting at columns, perimeters, shafts, stairs, and other openings. Provide tight fitting closures at the open uncovered ends and edges of decking, and all miscellaneous supports required to carry the metal decking. Secure hole reinforcement to decking with fillet welds placed on both sides of reinforcing members. Place reinforcement channels and angles across flutes and to project a distance beyond sides of openings equal to the maximum size of the opening unless otherwise shown. Perform field cutting and trimming square and neat, equal to factory cutting.

C. Welding: Use materials and methods in accordance with recommendations of metal decking manufacturer and approved submittals. Conform to AWS D1.1 and to the patterns and weld types shown, finished welds free of sharp points or edges. Field coat all welds and abraded surfaces upon completion with repair material. Omit the field coating where welds or abrasions are covered by concrete fill or sprayed fireproofing. Install welded shear studs according to Section 05065.

D. Damaged Decking: Remove and replace all metal decking with dents or other damage that adversely affects deck strength or subsequent materials, as directed.

3.2 CLEANING AND TOUCH-UP:

A. Remove surplus materials. Clean and touch-up raw edges of decking cut for openings with anodic galvanizing repair paint. Leave decks ready to receive subsequent materials.

3.3 FIELD QUALITY CONTROL:

A. Install all metal decking under continuous inspection, welding approved by Inspector before being covered (Contractor to retain and pay for the inspection and testing services). Conform welder qualifications and welding inspection to Code; conform to Section 050650 for inspection and testing of welded shear studs.

B. Additional inspecting at Contractor’s expense will be performed to determine compliance of corrected work with specified requirements.

END OF SECTION

SECTION 054000

COLD-FORMED METAL FRAMING (DESIGN BUILD)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Exterior non-load-bearing fascia framing.
   2. Exterior ceiling joist framing.

B. Related Sections include the following:
   1. Division 05 Section "Structural Steel" for steel angles and connections.
   2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Calculations: Provide complete calculations including conformance with specified design criteria. Calculations shall be signed by a registered professional engineer licensed in the State of California.

C. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work. Detail connections.

D. Submit shop drawings and calculations to architect/engineer for review and governing code authority for approval.

E. Welding certificates.

F. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
   1. Steel sheet.
   2. Expansion anchors.
   3. Power-actuated anchors.
   4. Mechanical fasteners.
   5. Horizontal drift deflection clips
   6. Miscellaneous structural clips and accessories.

G. Research/Evaluation Reports: For cold-formed metal framing.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

F. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
1. AllSteel Products, Inc.
2. Clark Steel Framing.
3. Dietrich Metal Framing; a Worthington Industries Company.
4. Innovative Steel Systems.
5. Steel Construction Systems.
6. United Metal Products, Inc.

2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
1. Grade: As noted on plans.
2. Coating: G60.

B. Steel Sheet for Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: As noted on plans.
2. Coating: G90.

2.3 EXTERIOR NON-LOAD BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As noted on plans.
2. Flange Width: As noted on plans.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As noted on plans.
2. Flange Width: As noted on plans.

C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
1. Manufacturers: Subject to compliance with requirements, provide products in compliance with SSMA.
2. Minimum Base-Metal Thickness: As noted on plans.
3. Flange Width: As noted on plans.

D. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.4 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As noted on plans.
   2. Flange Width: As noted on plans.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Bracing, bridging, and solid blocking.
   2. Anchor clips.
   3. End clips.
   4. Foundation clips.
   5. Backer plates.

2.6 ANCHORS,CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: [SSPC-Paint 20 or DOD-P-21035] [ASTM A 780].

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.8 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
   a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
   1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
   1. Stud Spacing: 16 inches or as indicated.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Install single-leg deflection tracks and anchor to building structure.
   2. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
   1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
      a. Install solid blocking at centers indicated.
   2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
   3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.5 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
   1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
   2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches from abutting walls, and as follows:
   1. Joist Spacing: 16 inches or as indicated.

D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated.

F. Install bridging at intervals indicated. Fasten bridging at each joist intersection as follows:
   1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
   2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer to ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Rough hardware.
2. Shelf angles.
3. Steel plank grating.
4. Angle Frames and edge angles.
5. Angle corner guards.
6. Pipe bollards.
7. Steel lintels.
8. Floor trench frames and covers.
9. Elevator threshold support angles.
10. Elevator intermediate guide rail supports.
11. Elevator hoist beams and hoistway divider beams.
12. Elevator sump gratings.

B. Related Sections:
1. Section 055100 – Metal Stairs.
2. Section 055133 – Ladders.
3. Section 055200 – Metal Railings.
4. Section 057000 – Decorative Metalwork.
5. Section 057300 – Decorative Metal Railings.
6. Section 099600 - High-Performance Coatings: Primers for steel to be coated with high-performance coatings.

C. This Project is a registered US Green Building Council “LEED” project.
1. Select materials to maximize use of recycled steel.
2. Select locally or regionally fabricated products wherever possible.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for manufactured components indicating type, finish, size, accessories, and anchorage details.

C. Shop Drawings:
1. Indicate profiles, dimensions, fabrication and installation details, size and type of fasteners, welds, accessory items, shop finish and method of anchorage.
2. Stamp shop drawings with seal and signature of professional engineer responsible for design.

D. Submit following Informational Submittals: Certifications specified in Quality Assurance article.

E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
   a. Metal Fabrications
2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
   a. Metal Fabrications
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
   a. Metal Fabrications

1.3 QUALITY ASSURANCE

A. Certifications: Fabricator's statement indicating fabrications are designed, fabricated, and installed to comply with code and Contract Document loading.

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with provisions of Section 016000.

PART 2 - PRODUCTS

2.1 FERROUS METALS, GENERAL

A. Steel Plates, Shapes and Bars: ASTM A36.
   1. Steel: Maximize use of recycled steel with minimum of 30 percent.

B. Steel Plank Grating: ASTM A569.

C. Steel Tubing:
   1. Cold-formed, ASTM A500
   2. Hot-rolled, ASTM A501.

D. Structural Steel Sheet:
   1. Hot-rolled, ASTM A1011/A1011M.
   2. Cold-rolled ASTM A1008/A1008M.
   3. Class 1; of grade required for design loading.

E. Galvanized Structural Steel Sheet: ASTM A653, of grade required for design loading. Coating designation; G90.

F. Steel Pipe: ASTM A53; type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless otherwise indicated.

G. Gray Iron Castings: ASTM A48, Class 30.

H. Malleable Iron Castings: ASTM A47, grade as selected by fabricator.

I. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

J. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

2.2 GROUT

A. Non-Shrink Grout:
   1. Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives.
   2. Minimum strength at 28 days: 5000 psi.
   3. Comply with ASTM C1107.
   4. Acceptable Products:
      a. Crystex, L&M Construction Chemicals, Omaha, NE.
      b. Masterflow 713, Master Builders, Cleveland, OH.
      c. Euco Rock Anchor Bolt Grout, Euclid Chemical Co., Cleveland, OH.
      d. SikaGrout 212, Sika Corporation, Lyndhurst, NJ.
      e. Five Star Grout, Five Star Products, Fairfield, CT.

2.3 FASTENERS

A. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
   1. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
   2. Eyebolts: ASTM A489.
   3. Machine Screws: ASME B18.6.3.
   4. Lag Bolts: ASME B18.2.1.
   5. Wood Screws: Flat head, ASME B18.6.1.
   6. Plain Washers: Round, ASME B18.22.1.

7. Lock Washers: Helical, spring type, ASME B18.21.1.
8. Masonry Anchorage Devices: Expansion shields.
9. Toggle Bolts: Tumble-wing type, class and style as required.

2.4 SURFACE PREPARATION AND APPLICATION

A. Steel surfaces to be primed must be dry and free of dirt, oils, rust, salt and other contaminants.

B. Blast-clean steel to "commercial grade" SSPC SP-6 for general use.

C. Galvanized Steel: Remove soluble and insoluble contaminants and corrosion. Sweep (Abrasive) Blasting per ASTM D6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).

D. Apply primers in accordance with manufacturer's instructions.

2.5 UNIVERSAL PRIMER

A. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.

B. Standard: FS TT-P-645.

C. Maximum Allowable Dry Time: 4 hours to touch; 24 hours to re-coat.

D. Compatible with finish paint system specified in 099000.

E. Acceptable Products:
1. Series 115 Uni-Bond, Tnemec Company, Inc., Kansas City, MO.
2. Carboguard 890 VOC, Carboline Company, St. Louis, MO.

2.6 ZINC-RICH PRIMER

A. Inorganic, zinc-rich, capable of providing sound foundation for field applied top coats despite prolonged exposure, cathodic protection and corrosion resistance. Similar to galvanizing.
1. Pigment Content: Minimum 63% zinc in dry film by weight.
2. Compatible with finish paint system specified in 099000.
3. Acceptable Products:
   a. Tnemec 94H_2O Hydro-Zinc, Tnemec Co., Kansas City, MO.
   b. Carbo-Zinc 859 VOC, Carboline Company, St. Louis, MO.
   c. ZRC Zero VOC Galvanizing Compound, ZRC Products Company, Quincy, MA.

2.7 GALVANIZING

A. Provide hot-dip galvanized coating in accordance with:
1. ASTM A153 - Iron and Steel Hardware.
2. ASTM A123 - Rolled, pressed and forged steel shapes, plates, bars and strips 1/8 inch thick and heavier.

B. Galvanizing Repair Paint:
1. Standard: MIL-P-21035 or SSPC-Paint-20.
2. Acceptable Products:
   a. Tnemec 94H_2O Hydro-Zinc, Tnemec Company, Inc., Kansas, MO.
   b. ZRC 221 Cold Galvanizing Compound, ZRC Products Company, Quincy, MA.

2.8 FABRICATION, GENERAL

A. Field verify dimensions prior to shop fabrication.

B. Minimize joints and seams by using largest stock sizes practical.

C. Locate multiple joints at regular intervals and at least conspicuous locations.

D. Form flush, tight, hairline joints and seams. Continuously weld joints and seams to develop the full strength of the jointed members.

E. Miter exposed joints. Grind exposed welds, seams and joints to form a smooth, uniform surface.

F. Weld in accord with AWS D1.1 for materials being welded.

G. Ease exposed edges to a minimum, uniform radius of [(1/32 inch)].

H. Fit and shop assemble sections in largest sizes practical for site delivery.

I. Fabricate work to exclude rain and condensate or provide weep holes to divert water to the exterior.

J. Form break metal corners to the smallest radius possible without distressing the finish surface.

K. Cut, drill, punch, tap, reinforce and provide anchors to accommodate adjoining work and hardware.

L. Provide anchors, bolts, rough hardware, fasteners and accessories required to incorporate and secure fabrications and to make the units functionally operational.

M. Use countersunk, flat head screws and bolts at exposed joints requiring mechanical fasteners.

N. At exposed work, use materials which are smooth, free of surface blemishes, pitting, seam marks, roller marks, trade names and roughness.

2.9 ROUGH HARDWARE

A. Furnish bent or custom fabricated bolts, plates, anchors, hangers, dowels and miscellaneous steel and iron shapes required for framing, supporting, anchoring or securing fixtures, accessories, and furnishings.

B. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

C. Fabricate items to sizes, shapes and dimensions required.

D. Furnish steel washers, except use malleable-iron washers for heads and nuts which bear on wood structural connections.

E. Finish: Same as item being supported or anchored.

2.10 OVERHEAD DOOR AND EQUIPMENT SUPPORTS

A. Provide weld plates, anchor plates, anchor bolts, angle iron clips, and related items required by overhead coiling door manufacturer for installation of overhead doors equipment.
   1. Fabricate in accordance with dimensions indicated and requirements of overhead door manufacturer.
   2. Provide angle iron, steel channels, steel tube end support posts, guide support framing and equipment framing.
   3. Fabricate and anchor members to structure to meet requirements and loads of overhead door manufacturer.

2.11 METAL BAR GRATING

A. Design Requirements:
   1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of grating system.

B. Basis of design is for products by the McNichols Co. Other acceptable manufacturers include the following:
   1. Grating Pacific.
   2. IKG Industries
   3. Or equal.

C. Steel Plank Gratings:
   1. Sheet and strip: ASTM A569.
   2. Finish: Galvanized.
   3. Type:
      a. Construction: “Grip Strut Plank Grating” diamond shaped openings
      b. Bearing plank height: 3 inches.
      c. Bearing plank thickness: 0.108 inches thick.
      d. Plank Width: As indicated on the Drawings.
      e. Clear span: As indicated.
      f. Surface: Serrated.

D. Metal Bar Grating Standards: Comply with applicable requirements of:
   1. Standard Metal Bar Gratings: Comply with NAAMM MBG 531, "Metal Bar Grating Manual for Steel, Stainless Steel, and Aluminum Gratings and Stair Treads."
   2. Heavy-Duty Metal Bar Gratings: Comply with NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual" for trucks and vehicles.

E. Fabrication:
   1. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
   2. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
   3. Shear and punch metals cleanly and accurately. Remove burrs.
   4. Ease exposed edges.
   5. Fit exposed connections accurately together to form hairline joints.
   6. Welding: Comply with AWS recommendations and the following:
      a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
      b. Obtain fusion without undercut or overlap.
      c. Remove welding flux immediately.
   7. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

F. Provide removable grating sections with banding bars attached by welding to entire perimeter of each section.

G. Include clips and fasteners of type indicated, or if not indicated, as recommended by manufacturer for attachment to support.

H. Provide not less than 4 saddle clips for each section with each clip designed and fabricated to fit over 2 bearing bars.

I. Furnish threaded bolts with nuts and washers for each clip required.

J. Fabricate cutouts in grating sections for penetration. Arrange layout of cutouts to permit grating removal without disturbing items penetrating gratings.

K. Edge band openings in grating which interrupt four or more bearing bars with bars of same size and material as bearing bars.

L. Do not notch bearing bars at supports to maintain elevation.

M. Provide hinges, lock hasp and lifting handles of same material as grating at opening sections.

N. Provide a minimum of two lifting handles at removable sections.

2.12 PARKING GARAGE PIPE GUARDS

A. Provide pipe guards of 3-by-3-by-5/16-inch steel angles, extending from floor to 42 inches above floor, with 3/8-inch steel baseplates for bolting to floor.
   1. Provide at least two vertical angles at each location, except at internal corners where one may be used.
   2. Connect tops of angles and anchor to wall or column with 1/4-by-2-inch steel strap braces welded to angles and bolted to wall.
   3. Galvanize pipe guards after fabrication.

2.13 PARKING GARAGE LOW OVERHEAD BAR

A. Bar: 3 inch diameter, PVC Schedule 40 pipe.

B. Attach to chain at 6 foot centers maximum locations with eye-bolts.

C. Chain: Trade size 4/0, general chain for light duty service, stainless steel, welded links 0.219 inch diameter by 0.50 inch wide by 0.875 inch long (inside) link size, working load 600 lbs. Provide with bolted end shackles.

D. Prime and paint in color selected by Architect.

E. Stencil with "_____ Headroom" with stated clearance height to lowest garage element in drive or parking stalls.

2.14 CAST STAIR NOSINGS

A. Manufacturers:
1. American Abrasive Metals Company.
2. American Safety Tread Company.
3. Barry Pattern and Foundry Company, Inc.
4. Safe-T-Metal Company, Inc.
5. Stubbs Foundry Company.
6. Wooster Products, Inc.

B. Description: Cast units with abrasive aggregate strips. Provide 70 percent contrasting color at each tread and landings at exterior steps.

C. Cast Stair Nosings:
1. Exterior Locations: Cast-aluminum units, corrosion resistant.
2. Comply with State of California Title 24 Safety Strip requirements for the visually impaired.

D. Size: 2 inches wide

E. Fabrication: Provide manufacturer's standard integral anchors for embedding units in concrete.

F. Stair Nosing Lengths: One piece full width of stair tread.

G. Concrete Construction: Apply black asphaltic coating to concealed bottoms, sides, and edges.

2.15 CATWALKS

A. Design Requirements:
1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of catwalk system.

B. Structural Performance: Provide components capable of withstanding the following structural loads without exceeding allowable design working stress of the materials involved, including anchors and connections:
1. Limit deflection to L/360 or 1/4 inch, whichever is less.
2. Capable of supporting live loads of 100 lbs/sq. ft.
3. Guardrails: Capable of withstanding following loads applied as indicated.
   a. Concentrated load of 200 pounds applied at any point and in any direction at top of guardrail system.
   b. Uniform load of 50 pounds per linear foot applied horizontally at the top of the guardrail system and a simultaneous load of 100 pounds per linear foot applied vertically downward at the top of the guardrail system.
   c. Concentrated and uniform loads above need not be applied simultaneously.

C. Walking Surfaces:
1. Above Toilet Room: Steel grating as indicated in Grating Article.

D. Handrails: Refer to Section 055200 – Metal and Railings.

E. Finish: Field finish under Section 099000.

F. Provide steel shapes, angles, brackets, anchors, and hangers to laterally brace assembly and resist structural loads, as detailed on the Drawings.

2.16 ANGLE FRAMES AND EDGE ANGLES

A. Edge Angles:
1. Provide edge angles of 3-by-3-by-5/16-inch steel angles for loading dock edges.
2. Anchor edge angles to loading dock with steel strap anchors welded to angles.
3. Provide edge angles and anchors for placement in fresh concrete.
4. Galvanize exterior edge angles after fabrication.

5. Complete with anchors and bolts. For casting in concrete, space anchors 24 inches OC with 1-1/4 inches by 1/4 inch by 8 inches steel straps.

B. Corner Angles:
1. Provide corner angles, extending from floor to 42 inches above floor, with 3/8-inch steel baseplates for bolting to floor. Provide at least two vertical angles at each location, except at internal corners where one may be used.
2. Anchor to edge angles to wall and column with 1/4-by-2-inch steel strap braces welded to angles on 30 inch centers (minimum of two for wall angles.
3. Provide edge angles and anchors for placement in fresh concrete.
4. Galvanize exterior edge angles after fabrication.

C. Lateral Supports for Storefronts:
1. Structural steel angles, sized for spans and wind loads, to support storefronts to structures.
2. Securely fasten angles to storefront and structure.

D. Operable Partition Supports:
1. Provide steel supports as required by folding partition manufacturer.
2. Continuous steel shapes and beams of sizes indicated with attached bearing plates, anchors, and braces as indicated.
3. Drill holes and provide threaded rod as required by partition manufacturer.
4. Locate holes where indicated on operable partition Shop Drawings.
5. Locate supports as required by manufacturer to suspend partitions from structure above without sags or undue deflection affecting operation of partitions.

E. Vanities and Countertops: Provide framing to support countertops.

F. Complete with anchors and bolts. For casting in concrete, space anchors 24 inches OC with 1-1/4 inches by 1/4 inch by 8 inches steel straps.

G. Finish: Universal primer.

2.17 ANGLE CORNER GUARDS

A. Type:
1. ASTM A240, UNS Number S30400.
2. Thickness: 0.125 inch.
3. Finish: No. 4 satin.

B. Height: 4 feet.

C. Attachment: Through drywall to metal studs with flat head countersunk, self-tapping stainless steel screws 16 inches OC.

2.18 METAL CLOSURE PANELS

A. Frame: Steel angle.

B. Cover: 18 gage sheet steel, ASTM A366/A366M, Class 1, matte finish.

C. Coordinate cut-outs for ducts, grilles, pipes with mechanical trades.

D. Construction: Screw panels to angle frames 4 inches OC. Secure angle frames to masonry and concrete 16 inches with expansion shields and bolts.

E. Finish: Universal primer.

2.19 PIPE BOLLARDS

A. Type: Standard steel pipe.

B. Fill with standard weight concrete; set in concrete foundations.

C. Continuously weld steel plate to top; grind smooth.

D. Finish: Universal primer Zinc-Rich primer.

2.20 BENCH BRACKETS

A. Prefabricated cast-iron, ASTM A48, Class 40.

B. Manufacturer: Type SB-40 by McKinley Iron Works, Inc., Fort Worth, TX.

C. Finish: Zinc-Rich primer.

2.21 FRAMING AND SUPPORTS

A. Provide framing to support ceiling hung toilet partitions, countertops , and movable partitions.

B. Finish: Universal primer.

2.22 FLOOR TRENCH FRAMES AND COVERS

A. Type: Prefabricated cast ductile iron frame and grates.

B. Nominal Size: As indicated on Drawings.

C. Finish: Uncoated.

D. Manufacturer:
1. Heavy Duty Neenah R-4990-C, Neenah Foundry, Neenah, WI.
2. Barry-Craft No. B-5518, Barry Pattern and Foundry Company, Birmingham, AL.
3. McKinley No. TGMB-10, McKinley Iron Works, Inc., Fort Worth, TX.

2.23 ELEVATORS

A. Hoist and Divider Beam:
1. Provide elevator equipment hoist beams required for elevator installation capable of supporting minimum load to be determined by the elevator manufacturer.
2. Provide elevator hoistway divider beams required for the support of cab and counter weight rails.
3. Finish: None.

B. Sill Support: Provide threshold support

C. Guide Rails: Provide intermediate guide rail supports sized and spaced as required by code and elevator manufacturer for guide rails spanning more than 14 feet between supports.

D. Screens Between Hoistways: When two or more elevators are installed within same hoistway, elevators shall be fully separated by material complying with following:
1. Screen full depth of pit to height of 6 feet above lowest landing.
2. Where unperforated steel is used, it shall be equal to or stronger than 0.0437 inch thick steel;
3. Where wire screen or perforated steel is used it shall be equal to or stronger than 0.0915 inch diameter metal grill;
4. Material shall reject ball 1 inch in diameter;
5. Be so supported and braced that when subjected to a pressure of 100 lb/SF applied horizontally at any point, the deflection shall not exceed 1 inch.

E. Sump Grating:
1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Material: Galvanized Steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Coordinate and furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors which are embedded in concrete or masonry construction.

3.2 INSTALLATION, GENERAL

A. Perform cutting, drilling and fitting required for installation of fabrications.

B. Set work accurately to established lines and levels.

C. Provide temporary bracing and anchors for items which are to be built into concrete, masonry or similar construction.

D. Fit exposed connections together to form tight hairline joints. Weld connections which are left as exposed joints.

E. Grind exposed joints smooth and touch-up shop paint.

F. Do not weld, cut or abrade galvanized surfaces of bolted or screwed connections.

G. Field Welding; comply with AWS Code D1.1.

H. Clean concrete and masonry bearing surfaces of any bond-reducing materials; roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

I. Set loose leveling and bearing plates on wedges, or adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut flush with edge of bearing plate before packing with grout.

J. Pack grout between bearing surfaces and plates; ensure no voids remain.

3.3 BAR GRATINGS

A. Comply with recommendations of "NAAMM Metal Bar Grating Manual" for installation, installation clearances and standard anchoring details.

3.4 PIPE GUARDS

A. Install pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to floor and wall or column with drilled-in expansion anchors.

3.5 PARKING GARAGE LOW OVERHEAD BAR

A. Mount “low overhead bar” suspended from structure on 4 chains.

B. Mount bottom of bar 1/2 inch below lowest garage element that could be an impediment to a vehicle in a drive lane or parking space.

3.6 BOLLARDS

A. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete.

B. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions.

C. Slope grout up approximately 1/8 inch toward bollard.

D. Fill bollards solidly with concrete, mounding top surface.

3.7 ADJUST AND CLEAN

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas and paint with same material used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. For Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint complying with ASTM A780.

END OF SECTION

SECTION 055100

METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal Pan Stairs.

B. Related Sections:
   1. Section 055133 - Ladders.
   2. Section 055200 - Metal Railings.
   3. Section 099000 - Paints and Coatings.
   4. Section 099600 - High-Performance Coatings: Primers for steel to be coated with high-performance coatings.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Fabricator is responsible for designing system, including necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of stair system.
   3. In addition to requirements shown or specified, comply with NAAMM Metal Stairs Manual for design, materials, fabrication, and installation.
   4. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   5. Make modifications only to meet field conditions and ensure fitting of components.
   6. Obtain Architect's approval of modifications and for connections to building elements at locations other than indicated on Drawings.
   7. Provide concealed fastening wherever possible.
   8. Attachment Considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.

B. Structural Requirements:
   1. Live Load on Stairs and Platforms: 100 psf at treads and platforms and 300 pounds on area of 4 square inches at center of tread.
   2. Maximum Allowable Deflection: L/360.

C. Interface With Adjacent Systems: Coordinate with handrails and railings specified in Section 055200

1.3 SUBMITTALS

A. General: Submit following items under provisions of Section 013300

B. Product Data: Submit product data for primer [and manufactured drop-in stairs].

C. Shop Drawings:
   1. Indicate profiles, dimensions, connection attachments, reinforcing, anchorage, openings, size and type of fasteners, and accessories.
   2. Show treads, steel risers, nosings, landings, stringers and other components.
   3. Stamp shop drawings with seal and signature of professional engineer responsible for design.

D. Submit following Informational Submittals:
   1. Support reactions design data.
   2. Certifications specified in Quality Assurance article.

3. Qualification data: Engineer's, fabricator's, and welders qualification data.

E. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
      a. Metal Stairs
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Metal Stairs.
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Metal Stairs

1.4 QUALITY ASSURANCE

A. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of metal stair systems.

B. Fabricator Qualifications: Company specializing in fabricating work specified in this Section with minimum 5 years documented experience.

C. Certifications:
   1. Submit certificates verifying AWS qualifications for each welder employed on Project.
   2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
   3. Engineering certifications.
   4. Certification that fabrication and installation comply with structural requirements listed this Section.

1.5 DELIVERY, STORAGE, HANDLING

A. Comply with provisions of Section 016000.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Maximize use of recycled steel with minimum of 30 percent.

B. Steel Section: ASTM A36.

C. Steel Tubing: 1-1/4 inches N.P.S. ASTM A53, Grade B, Schedule 40, or as required for design loading.

D. Steel Sheet: ASTM A1011/A1011M G90 galvanized or ASTM A1008/A1008M; grade as required for design loading.

E. Fasteners:
   1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
   2. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
   3. Eyebolts: ASTM A489.
   4. Machine Screws: ASME B18.6.3.
   5. Lag Bolts: ASME B18.2.1.
   6. Wood Screws: Flat head, ASME B18.6.1.
   7. Plain Washers: Round, ASME B18.22.1.
   8. Lock Washers: Helical, spring type, ASME B18.21.1.
   9. Masonry Anchorage Devices: Expansion shields.
   10. Toggle Bolts: Tumble-wing type, class and style as required.

F. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

2.2 STAIR NOSINGS

A. Manufacturers:
   1. Wooster Products, Inc.
   2. Balco, Inc.
   3. American Safety Tread Company.
   4. Barry Pattern and Foundry Company, Inc.
   5. Safe-T-Metal Company, Inc.

B. Description: Cast units with aluminum oxide abrasive aggregate strips. Provide 70 percent contrasting color at top and intermediate landings and first tread above landings and walking surfaces.

C. Cast Stair Nosings:
   1. Interior Locations: Cast-aluminum units, corrosion resistant for bottom tread and top and intermediate landings for each flight.
   2. Comply with State of California Title 24 Safety Strip requirements for the visually impaired.

D. Size: 2 inch by 1/4 inch thick.

E. Fabrication: Provide manufacturer's standard integral anchors for embedding units in concrete.
   1. Stair Nosing Lengths: One piece, stair width between railings minus 4 inches.
   2. Concrete Pan Construction: Apply black asphaltic coating to concealed bottoms, sides, and edges.

F. Abrasive Inserts at Nosings:
   1. Aluminum oxide or silicon carbide granules in epoxy matrix, shop-cast and cured into extruded aluminum nosing.
   2. Safety color selected by Architect.
   3. Barrier-free design.
   4. Provide 2 inch wide safety strip on bottom tread and top step/landing.
   5. Acceptable Products:
      a. Type 9311, American Safety Tread Co., Inc.
      b. P-200, Balco, Inc.
      c. Type WP2J, Wooster Products Inc.

2.3 SURFACE PREPARATION AND APPLICATION

A. Steel surfaces to be primed must be dry and free of dirt, oils, rust, salt and other contaminants.

B. Blast-clean steel to "commercial grade" SSPC SP-6 for general use.

C. Apply primers in accordance with manufacturer's instructions.

2.4 UNIVERSAL PRIMER

A. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.

B. Standard: FS TT-P-645.

C. Maximum Allowable Dry Time: 4 hours to touch; 24 hours to re-coat.

D. Compatible with finish paint system specified in 099000.

A. Acceptable Products:
   1. Series 88HS [115 Uni-Bond (California)], Tnemec Company, Inc., Kansas City, MO.
   2. Carboguard 890 VOC, Carboline Company, St. Louis, MO.

2.5 FABRICATION

A. Verify dimensions on site prior to shop fabrication.

B. Join pieces together by welding.

C. Provide complete stair assemblies, including metal framing, hangers, columns, struts, clips, brackets and bearing plates.

D. Bolt or weld headers to stringers and framing members to stringers and headers; fabricate so that bolts, if used, do not appear on finish surfaces.

E. Fabricate joints and seams to be as strong and rigid as adjoining sections. Joints to be close fitting and where least conspicuous.

F. Grind exposed welds flush and smooth.

G. Close exposed ends of stringers.

H. Provide clip angles for fastening of furring channels, where an applied finish is indicated for soffits.

I. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans indicated but not less than that required to support total design loading.
   1. Form metal pans of cold-rolled carbon steel sheet unless otherwise indicated.
   2. Attach risers and subtreads to stringers by means of brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding.
   3. Provide subplatforms of configuration and construction indicated, or if not indicated, of same metal as risers and subtreads and in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

2.6 FINISHES

A. Interior Stairs: Universal primer.

B. Provide final painting under Section 099000.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates and directions for installation of inserts and anchors, anchor bolts and miscellaneous items having integral anchors embedded in concrete.

B. Coordinate and furnish inserts and anchors set in concrete [masonry] for installation of work.

C. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly of units. Disassemble units only as necessary for shipping and handling. Mark units for re-assembly and coordinated installation.

3.3 INSTALLATION

A. Provide anchorage devices, fasteners, hangers or struts where necessary for securing items to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts and connectors.

B. Cut, drill and fit as required for installation of work. Set work in location, alignment and elevation, plumb and level, true and free of rack. Install per approved shop drawings.

C. Fit exposed connections to form tight hairline joints. Field-weld connections which cannot be shop-welded. Grind joints smooth and touch up shop primer coat.

D. Leave metal stairs ready to receive finish, where applicable, per Section 099000 - Paints and Coatings.

E. Fill metal pans with concrete specified in Section 033000. Install abrasive nosing in accordance with manufacturer’s written instructions.

3.4 CLEANING

A. Immediately after erection, clean field welds, bolted connections and damaged shop coat, and re-coat.

END OF SECTION

SECTION 055133

LADDERS

PART 1 THIS SECTION - GENERAL

1.1 SUMMARY

A. Section Includes: Steel ladders.

B. Related Sections:
   1. Section 099000 - Paints and Coatings.
   2. Section 099600 - High-Performance Coatings: Primers for steel to be coated with high-performance coatings.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Fabricator is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of ladder system.

B. Structural Requirements:
   1. Ladders: In addition to requirements shown and specified, comply with applicable provisions of ANSI A14.3 for design, materials, fabrication, and installation of component parts[, and with ANSI/ASME A17.1 ladder requirements at elevator pits].
   2. Stair Treads: Capable of withstanding concentrated 1000 lb load without deformation.
   3. Handrail: Capable of withstanding load of 200 lb applied in any direction at any point on rail.

1.3 SUBMITTALS

A. General: Submit following items under provisions of Section 013300.

B. Product Data: Submit product data for primer paint.

C. Shop Drawings:
   1. Stamp shop drawings with seal and signature of professional engineer responsible for design.
   2. Submit shop drawings showing dimensions, fabrication and installation details. Indicate size and type of fasteners, welds, accessory items, shop finish and method of anchorage.

D. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Engineer's, fabricator's, and welder's qualification data.

E. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
      a. Metal Ladders
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Metal Ladders.
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Metal Ladders

1.4 QUALITY ASSURANCE

A. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of metal ladders.

B. Fabricator Qualifications: Company specializing in fabricating work specified in this Section with minimum 5 years documented experience.

C. Welder Qualifications: AWS certified within past 12 months for each type of weld required.

D. Certifications:
   1. Submit certificates verifying AWS qualifications for each welder employed on Project.
   2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
   3. Engineering Certifications.
   4. Furnish certification that code required design loadings have been complied with in the design and fabrication of the work.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with provisions of Section 016000.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Section: ASTM A36.
   1. Steel: Maximize use of recycled steel with minimum of 30 percent.

B. Steel Sheet: ASTM A653, G90, (galvanized) or ASTM A1008, grade as required for design loading.

C. Fasteners:
   1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
   2. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
   3. Eyebolts: ASTM A489.
   4. Machine Screws: ASME B18.6.3.
   5. Lag Bolts: ASME B18.2.1.
   6. Wood Screws: Flat head, ASME B18.6.1.
   7. Plain Washers: Round, ASME B18.22.1.
   8. Lock Washers: Helical, spring type, ASME B18.21.1.
   9. Masonry Anchorage Devices: Expansion shields.
   10. Toggle Bolts: Tumble-wing type, class and style as required.

D. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

2.2 VERTICAL LADDERS

A. Type: Vertical steel ladders consisting of the following components:
   1. Side Rails: 3/8 inch by 2-1/2 inches flat steel bars with eased edges.
      a. Space side rails 18 inches apart.
   2. Rungs: 3/4 inch minimum round steel bars spaced 12 inches maximum on center, punched through the stringers and plug welded.
   3. Provide non-slip surface on top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using manufactured rung filled with aluminum oxide grout.
   4. Angle Supports: Support ladders by steel angles bolted to walls and floors to provide minimum of 7 inches from face of wall to centerline of rungs; 4-1/2 inches from face of wall to centerline of rungs at elevator pits. Locate at 5 feet on center and within 16 inches of top and bottom.

5. Safety Handrails: Extend rails 48 inches above top rung and anchor to structure, if adjacent structure does not extend above top rung, gooseneck extended rails back to structure.

2.3 FABRICATION PROCEDURES

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Verify measurements in field for work fabricated to fit Project conditions. Before starting work, examine adjoining work on which work of this section is in any way dependent for workmanship and fit.

C. Fabricate finish surfaces smooth, unless otherwise specified.

D. Cut, punch, drill and tap for attachment of work coming in contact with ladder where indicated or where directions for same are given prior to or with approval of shop drawings.

E. Make joints as strong and rigid as adjoining sections. Make exposed joints close fitting and where jointing is least conspicuous. Unless otherwise indicated or specified, full weld joints and seams and dress smooth where exposed.

F. Connections and Accessories: Weights of connections and accessories shall meet design loads.

2.4 SURFACE PREPARATION AND APPLICATION

A. Steel surfaces to be primed must be dry and free of dirt, oils, rust, salt and other contaminants.

B. Blast-clean steel to "commercial grade" SSPC SP-6 for general use.

C. Apply primers in accordance with manufacturer's instructions.

2.5 UNIVERSAL PRIMER

A. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.

B. Standard: FS TT-P-645.

C. Maximum Allowable Dry Time: 4 hours to touch; 24 hours to re-coat.

D. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
   1. Cal-GREEN Requirements for typical paint coatings:
   2. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water

E. Compatible with finish paint system specified in 099000.

A. Acceptable Products:
   1. Series 115 Uni-Bond (California) , Tnemec Company, Inc., Kansas City, MO.
   2. Carboguard 890 VOC, Carboline Company, St. Louis, MO.

2.6 FINISHES

A. Interior:
   1. Ladders: Universal primer.

B. Final painting under Section 099000 - Paints and Coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 INSTALLATION

A. Set items in position, align and brace securely until permanent anchorage is made.

B. Install supporting members, fastenings, framing, hangers, bracing brackets, straps, bolts and angles required to set and connect work to structure.

C. Provide suitable anchors.

D. Upon completion of installations, re-examine work and provide additional shims, washers, anchors and corrective work to ensure that installation is firm, tight, anchored, in alignment with neat fits, without distortion, unsightly fastenings, raw edges or protrusions.

E. Elevator Pit Ladder: Locate within reach of access door.

3.3 PROTECTION

A. Protect finished installation under provisions of Section 017300.

END OF SECTION

SECTION 055200

METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Round steel tube handrails and guardrails.

B. Related Sections:
   1. Section 051200 - Structural Steel Framing.
   2. Section 055100 - Metal Stairs.
   3. Section 057300 – Decorative Metal Railings.
   4. Section 099000 - Painting and Coatings.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.

1.2 DEFINITIONS

A. Guardrail: A system of building components located near the open sides of elevated walking surfaces for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level.

B. Handrail: A horizontal or sloping rail grasped by hand for guidance or support, and for the purpose of minimizing the possibility of accidental falls on the adjacent walking surface.

1.3 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Fabricator is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of handrail and railing system.
   3. In addition to requirements shown or specified, comply with NAAMM Pipe Railing Manual for design, materials, fabrication, and installation.
   4. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   5. Provide concealed fastening wherever possible.
   6. Make modifications only to meet field conditions and to ensure fitting of components.
   7. Obtain Architect's approval of modifications.

B. Structural Requirements:
   1. Handrails and Guards: Capable of withstanding following loads applied as indicated.
      a. Concentrated load of 200 pounds applied at any point along the top, in any direction, and have attachment devices and supporting structure to transfer this loading to appropriate structural elements of the building.
      b. Uniform load of 50 PLF applied in any direction at the top and to transfer this load through the supports to the structure.
      c. Concentrated and uniform loads above need not be applied simultaneously.
   2. Infill Area of Guardrail System: Intermediate rails (all those except the handrail), balusters, and panel fillers shall withstand horizontal load of 50 pounds on area equal to 1 square foot, including openings and space between rails. Above load need not be assumed to be acting concurrently with horizontal loads on railing system.

C. Interface with Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections for structural members in installation.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for primer, grout, anchorage devices, and connection devices.

C. Shop Drawings:
   1. Stamp shop drawings with seal and signature of professional engineer responsible for design.
   2. Submit shop drawings showing dimensions, materials, fabrication and installation details.
   3. Indicate size and type of fasteners, welds, accessory items, shop finish and method of anchorage.
   4. Indicate material type and grades.

D. Submit following Informational Submittals:
   1. Support reactions design data.
   2. RETAIN FOLLOWING Certifications specified in Quality Assurance article.
   3. Qualification Data: Engineer's, fabricator's, and welder's qualification data.
   4. Manufacturer's instructions.

E. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
      a. Metal Railings
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Metal Fabrications.
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Metal Railings

1.5 QUALITY ASSURANCE

A. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of metal handrail and railing systems.

B. Welder Qualifications: AWS certified within past 12 months for each type of weld required.

C. Regulatory Requirements: Conform to requirements of local building codes and authorities having jurisdiction over Project.

D. Certifications:
   1. Submit certificates verifying AWS qualifications for each welder employed on Project.
   2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
   3. Engineering certifications.

1.6 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Maximize use of recycled steel with minimum of 30 percent.

B. Railing System:
   1. Round Structural Tubing:
      a. ASTM A500, seamless, Grade A.
      b. Finish: Standard.
   2. Structural Plates, Shapes, and Bars:
      a. ASTM A36/A36M; refer to Section 051200.
      b. Finish: To match tubing.

C. Railing System Anchor Sleeves and Inserts:
   1. Structural Plate and Bars: ASTM A36/A36M.
   2. Headed Stud Anchors: ASTM A108, grades 1010 through 1020, AWS D1.1, Section 7, Grade B, forged steel, headed, uncoated.
   3. Pipe Sleeves:
      a. ASTM A53 with steel plate welded to bottom, black finish.
      b. Size to provide 1/8 inch minimum space between inside of sleeve and outside of railing post after allowance for placement and erection tolerances. Minimum length of 5 inches and minimum diameter of 1 inch larger than maximum post dimension.
      c. Provide temporary closure on top of sleeve to prevent concrete and moisture penetration.

D. Railing Accessories:
   1. Fittings: Fabricate tees, elbows, splice connections, wall returns, wall ends, rail caps, post caps, and accessories from same material and finish as railing.
   2. Mounting Flanges and Anchor Plates:
      a. Fabricate of same material and finish as railing.
      b. Provide holes for anchorage to adjacent construction.
   3. Handrail Brackets:
      a. ASTM A47 or ASTM A48 iron casting or fabricate of same material as railing.
      b. Same finish as railing.

E. Fasteners:
   1. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
   2. Eyebolts: ASTM A489.
   3. Machine Screws: ASME B18.6.3.
   4. Lag Bolts: ASME B18.2.1.
   5. Wood Screws: Flat head, ASME B18.6.1.
   6. Plain Washers: Round, ASME B18.22.1.
   7. Lock Washers: Helical, spring type, ASME B18.21.1.
   8. Masonry Anchorage Devices: Expansion shields.
   9. Toggle Bolts: Tumble-wing type, class and style as required.
   10. Concrete Expansion Anchors:
      a. Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
      b. Finish: Zinc-plated.
   11. Finish: Provide hot-dip zinc coating in accordance with ASTM A153 for anchors in exterior use.

F. Non-Shrink Grout:
   1. Premixed and packaged non-ferrous aggregate, non-staining, shrinkage-resistant, non-corrosive, non-gaseous complying with ASTM C1107, 5000 psi minimum compressive strength.
   2. Acceptable Products and Manufacturers:
      a. Crystex, L&M Construction Chemicals, Omaha, NE.
      b. Masterflow 713, Master Builders, Cleveland, OH.
      c. Euco Rock Anchor Bolt Grout, Euclid Chemical Co., Cleveland, OH.
      d. SikaGrout 212, Sika Corporation, Lyndhurst, NJ.
      e. Five Star Grout, Five Star Products, Fairfield, CT.

G. Provide templates for locating components.

2.2 FABRICATION

A. General:
   1. Verify dimensions on site prior to shop fabrication.
   2. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

B. Design Requirements:
1. Return railings to walls at ends.
2. Extend railings 12 inches beyond top riser and 12 inches beyond plus 1 tread beyond bottom riser where not continuous.
3. Make clear distance between components of guardrail infill such that 4 inch diameter sphere cannot pass through opening.
4. Grind welded joints and surfaces smooth, with no sharp or abrasive corner edges or surfaces.

C. Railing Components:
1. Use prefabricated fittings for joining railing components.
2. Use prefabricated radius bends or bend pipe to form radius bends free from buckles or twist, with smooth finished surfaces.
3. Fabricate joints exposed to weather to exclude water or provide weep holes.
4. Remove burrs from exposed cut edges.
5. Close exposed ends of pipe and tube with cap or end fitting.
6. Fabricate toe boards or kick plate of 4 inches wide by 1/8 inch steel plate unless noted otherwise.
7. Barrier Gate: Provide self-closing, unlatched, hinged gates where necessary in stairwell to direct traffic toward main exit and to prevent egress traffic from going to basement. Fabricate gate in same configuration as railing, complete with springs, hinges, and stops.

D. Connection of Railing Components:
1. Use internal welding connector sleeves.
2. Completely weld joints, without undercutting or overlap.
3. Remove slag, grind exposed welds smooth and contour surface to match adjacent surfaces.
4. Bolted or riveted connections are not acceptable.

2.3 FINISHES

A. General:
1. Apply primers in accordance with manufacturer's instructions.
2. Steel surfaces to be primed must be dry and free of dirt, oils, rust, salt and other contaminants.

B. Surface Preparation:
1. Interior Uncoated Surfaces: Remove mill scale, rust and dirt by SSPC-SP3 power tool cleaning.

C. Finish Types:
1. Universal Primer:
a. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.
b. Standard: FS TT-P-645.
c. Compatible with finish paint system specified in 099000.
d. Acceptable Products:
1) Series 115 Uni-Bond (California), Tnemec Company, Inc., Kansas City, MO.
2) Carboguard 890 VOC, Carboline Company, St. Louis, MO.
2. Final painting under Section 099000 - Painting and Coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify installation tolerances of items embedded in other work:
1. Spacing: Plus or minus 3/8 inch.
2. Alignment: Plus or minus 1/4 inch.
3. Plumbness: Plus or minus 1/8 inch.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, embedded sleeves, concrete inserts, and anchor bolts.

B. Clean sleeves of debris.

3.3 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Fit exposed connections accurately to form tight, hairline joints. Make joints as strong and rigid as adjoining construction. Fully weld joints and seams and dress smooth where exposed.

C. Set posts plumb and align to within 1/4 inch in 12 feet. Set rails horizontal or parallel to rake of steps or ramp to within 1/4 inch in 12 feet.

D. Anchoring Posts:
1. Anchor posts in preset sleeves anchored in concrete. Fill annular space between posts and sleeves solid with non-shrink non-metallic grout. Wipe off excess grout and leave [(1/8 inch)] build-up sloped away from post.
2. Anchor posts by welding to imbedded plates preset and anchored in concrete.
3. Anchor posts with floor flange or facia flange and facia brackets to concrete with concrete expansion anchors and to steel by bolting or field welding.

E. Attach Wall Rails:
1. Install with 1-1/2 inches clearance from inside face of handrail to finished wall surface.
2. Concrete and Solid Masonry: Expansion anchors; expansion shields and concealed hanger bolts, or exposed lag bolt.
3. Hollow Masonry: Toggle bolts
4. Stud Partitions: Secure to metal grounds with toggle bolt; wood blocking with lag bolt.
5. Provide wall handrails brackets spaced maximum of 6 feet on center or as noted on Drawings.

F. Expansion Joints:
1. Provide slip joint with internal sleeve extending 2 inches beyond joint on each side.
2. Fasten sleeve to one side only.
3. Locate expansion joints within 6 inches of post.
4. Provide at intervals of maximum 40 feet centers for railings exceeding 60 feet.

3.4 CLEANING

A. Touch-Up Painting:
1. Perform immediately after erection.
2. Clean field welds of flux.
3. Power-tool clean abraded shop paint.
4. Paint exposed areas with shop primer.
5. Clean field welds and abraded areas of galvanized surfaces and apply galvanizing repair paint per ASTM A780.

B. Final Painting: Furnished under Section 099000.

3.5 PROTECTION

A. Protect railings under provisions of Section 017300.

END OF SECTION

SECTION 055813

COLUMN COVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal column covers for:
      a. Exposed columns.
      b. Horizontal steel bracing, custom shape.

B. Related Sections: Section 079200 - Joint Sealants.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled content.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for each type column cover, including paint products and other finishing materials.

C. Shop Drawings:
   1. Submit shop drawings for fabrication of column cover work.
   2. Include plans, elevations and detail sections.
   3. Indicate jointing, fasteners, anchorage, and accessory items, and specify finishes.

D. Samples:
   1. Submit 8 inch square samples of each metal finish required. Prepare samples on metal of same alloy and thickness used for the work.
   2. Show typical welds, fasteners, miters, and anticipated joints for compatible finish.
   3. Submit 12 inch long sample of mating joint components.

E. Submit following Informational Submittals: Manufacturer's instructions.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
      a. Metal Stairs
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Metal Stairs.
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Metal Stairs

1.3 MOCK-UPS

A. General: Comply with provisions of Section 014500.

B. Upon approval of shop drawings and samples, erect full size, in-place mock-up to be reviewed for all aspects of installation, joints, connections, profiles, finishes, line, level and dimensions.

1.4 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference under provisions of section 013100.

B. Perform testing agency services under provisions of section 014500.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

B. Protect finished surfaces as necessary to prevent damage.

C. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.

D. Do not leave coating residue on any surfaces.

E. Replace damaged units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Centria Architectural Products, Series 3000 or a comparable product of one of the following manufacturers:
1. Series 200, Una-Clad, Firestone Metal Products.
2. Series KS, Fry Reglet, Alhambra, CA.
3. VG-360 Series, MM Systems Corporation, Tucker, GA.
4. Series 1500 Snap-Form, Pittcon Industries, City of Industry, CA.
5. Columnar, Ceilings Plus, Los Angeles, CA.

2.2 MATERIALS

A. Aluminum Sheet: ASTM B209, 3003-H14, .080 inch thick.

B. Sealants: Refer to Section 079200.

2.3 FABRICATION

A. Fabricate components straight and true-to line and curve, free from scratches, scars, creases, buckles, ripples, or chatter marks.

B. Select materials for smoothness and freedom from surface blemishes on exposed-to-view areas.

C. Shop Assembly:
1. Preassemble items in the shop to minimize field splicing and assembly.
2. Disassemble units only as necessary for shipping and handling limitations.
3. Clearly mark units for reassembly and coordinated installation.

D. Fasteners and Connections: Concealed, whenever possible.

E. Formed or Bent Corners: 1/4 inch minimum radius.

F. Clips, Braces and Miscellaneous Attachments: Hot-dip galvanized steel or aluminum.

G. Horizontal Joints: 12 feet maximum.

2.4 FINISHES

A. Fluoropolymer Coating:
1. Comply with AAMA 620 or 621; fluorosurfactant free (FSF) formulation.
2. Resin: 70 percent polyvinylidene fluoride (PVDF).
3. Substrate: Cleaned and pre-treated.
4. 2 COAT COIL AND EXTRUSION SYSTEM FOR USE WITH MOST MANUFACTURERS STANDARD AND PREMIUM COLORS. 0.020 mm (0.80 mil) THICK PRIMER FOR AGGRESSIVE (OCEAN FRONT) ENVIRONMENTS IS Primer:
   a. Coating: Manufacturer's standard epoxy or acrylic coating.
   b. Dry Film Thickness: Minimum 0.20 mil.
5. Topcoat:
   a. Coating: PVDF.
   b. Dry Film Thickness:
      1) Coil: 0.80 mil.
      2) Extrusion: 1.0 mil.
6. Color: Manufacturer's standard colors as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 PREPARATION

A. Coordinate setting drawings and installation of anchors with other trades.

3.3 INSTALLATION

A. Attaching Clips and Devices: Weld to structural steel columns, braces, or expansion bolt to concrete columns.

B. Exercise care not to mar or scratch exposed finishes.

C. Secure snap-in closures at butt joints by use of friction clips and pressure.

D. Exposed fasteners in finished work will not be permitted.

E. Form tight joints at exposed joints accurately fitted together. Provide reveals and openings for sealants and joint fillers.

F. Tolerances at Joints: 0 inch plus 1/32 inch horizontally or vertically.

G. Install sealants in compliance with Section 079200 as necessary to complete work.

3.4 CLEANING

A. Perform final cleaning under provisions of Section 017300.

B. Do not remove protective covering until Project is ready for occupancy.

3.5 PROTECTION

A. Protect finished installation under provisions of Section 017300.

B. Protect finished work from damage and scarring by boxing or other method until final acceptance or occupancy of the project or area by Owner, whichever occurs first.

END OF SECTION

SECTION 057200

DECORATIVE WIRE ROPE AND METAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stainless Steel Wire Rope and fittings for vines.
   2. Greenscreen.

B. Related Sections:
   1. Section 099600 - High-Performance Coatings: Field applied metallic coatings for exposed architectural metals.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM REQUIREMENTS

A. General:
   1. Provide metals free from surface blemishes where exposed to view in finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
   2. In addition to requirements shown or specified, comply with design requirements of Section 014450.

B. Design Requirements: Fabricator responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   1. Employ registered professional engineer, licensed to practice structural engineering, to engineer each component of decorative metalwork.
   2. Provide components capable of withstanding live, dead, and wind loads applied to building as dictated by code.
   3. Provide components, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
   4. Drawings: Diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
   5. Requirements Shown by Details: Establish basic dimension of units, sight lines and profiles of members.
   6. Assemblies: Free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
   7. Attachments: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between units themselves.
   8. Anchors, Fasteners and Braces: Structurally stressed not more than 50 percent of allowable stress when maximum loads are applied.
   9. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
   10. Provide uniform color and profile appearance at components exposed to view.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for each proprietary product used in decorative metalwork, including finishing materials and methods.

C. Shop Drawings:
   1. Submit shop drawings showing fabrication, and installation of decorative metalwork.
   2. Include:
      a. Fully dimensioned plans, and elevations, with detail coordination keys.

b. Components, and attachments to other units of Work.
c. Materials and profiles of each decorative metalwork member, fitting, joinery, finishes, fasteners, anchorages, and accessory items.
d. Setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
e. Necessary flashings and sealants when decorative work penetrates or connects with exterior building enclosure.

D. Samples:
1. Submit samples indicating each profile and pattern quality of finish in required colors on actual materials used for work, 12 inches long for extrusions and 6 inches square for sheet materials. Structural shapes not needed.
2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.

E. Submit following Informational Submittals:
1. Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" Article.
2. Qualification data for firms and persons specified in "Quality Assurance" Article.
3. Include lists of completed projects with project names and addresses, names and addresses of architects and owners.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
a. Decorative Metal.
2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
a. Decorative Metal.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
a. Decorative Metal.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in successfully producing decorative metalwork similar to that indicated for this Project and with sufficient production capacity to produce required units without delaying Work.

B. Installer Qualifications: Arrange for installation of decorative metalwork specified in this Section by same firm that fabricated it.

C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code - Steel".

D. Certifications: Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

E. Preinstallation Conference: Conduct conference at Project Site to comply with requirements of Section 013100.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Store decorative metalwork inside well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

PART 2 - PRODUCTS

2.1 METALS

A. General:
1. Provide architecturally exposed metals free from surface blemishes in finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
2. Provide architectural grade steel where exposed to view.
3. Metal: Maximize use of recycled steel or aluminum with minimum of 30 percent.

B. Stainless Steel:
1. Pipe: ASTM A312/A312M, Grade TP304.
2. Sheets: ASTM A240, UNS Number S30200 or S30400.
3. Fasteners: Stainless steel
4. Tubing: ASTM A 554, Grade MT 304.
5. Castings: ASTM A 743/A 743M, Grade CF 8 or Grade CF 20.

RETAIN SUBPARAGRAPH ABOVE WITH TYPE 304, SUBPARAGRAPH BELOW WITH TYPE 316.

6. Castings: ASTM A 743/A 743M, Grade CF 8M.
7. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.
8. Bars and Shapes: ASTM A 276, Type 304.

C. Steel and Iron: Provide steel and iron in form indicated complying with following requirements:
1. Steel Plate, Shapes, and Bars: ASTM A36.
2. Steel Tubing: Cold-formed, ASTM A500.
3. Structural Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Class 1; of grade required for design loading.
4. Cold-Rolled Steel Sheet, Commercial Quality: ASTM A1008/A1008M.
5. Gray Iron Castings: ASTM A48, Class 30.
6. Malleable Iron Castings: ASTM A47, grade as recommended by fabricator for type of use indicated.

D. Sheet Steel:
1. Provide materials selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit.
2. Do not use materials having exposed-to-view surfaces exhibiting pitting, seam marks, roller marks "oil canning", stains, discoloration or other imperfections.
3. Galvanized Sheet Steel: ASTM A653, (commercial quality), or (lockforming quality), Coating Designation G90, mill phosphatized.
4. Sheet Steel: Commercial quality cold-rolled carbon steel sheet as follows, unless otherwise indicated:
   a. Zinc-coated Sheet Steel: ASTM A879, with Class C zinc coating; chemically treated in mill with phosphate solution and light chromate rinse.
   b. Sheet Steel: ASTM A1008/A1008M, Class I, matte finish.
5. Provide Phillips flat-head or hex-head machine screws for exposed fasteners.
6. Form sheet metal items in maximum lengths with minimum joints.
7. Do not expose cut edges of sheet metal.
8. Fold back exposed ends of unsupported sheet metal to form 1/2 inch wide hem of concealed side or ease exposed edges with backing to radius of approximately 1/32 inch.
9. Form items with flat, flush surfaces, true to line and level, without cracking or grain separation at bends.
10. Install with fastener patterns indicated.

E. Stainless Steel Wire Rope System: ASTM A492 Type 316 wire rope; fabricated to 7 by 7 configuration.
1. Wire Rope Fittings: Connectors, turnbuckles, and other types indicated and required, fabricated from Type 316 stainless steel, able to sustain, without failure, a load equal to the minimum breaking strength of the wire rope with which they are used.
2. Fasteners and Accessories: Stainless steel Type 316.

3. Length:
   a. Optimum adjustment in both directions by calculating final tendon lengths with allowance for tensioning fittings with 2/3 open and with 1/3 of thread length engaged.
   b. Measure tendon length from center of pin to center of pin, or center of eye to center of eye.
4. Accessories: Provide grommet, bushings, nuts, washers, turnbuckles, fittings and other components as required for system installation
5. Product and Manufacturer: Vertical Plan Support Trellis System using I-SYS Stainless Steel Ropes and Components, Carl Stahl, or equal.

F. Greenscreen:
1. 14 gage galvanized steel wire welded to form a 2 x 2 inch face grid, front and back of panel, separated by bent wire trusses either 2 or 3 inches in depth.
2. Modular panels for wall mounting; sizes as required for design.
3. Trim: 20 gage galvanized steel sheet welded to the wire frame panels.
4. Provide edge and channel trim as necessary.
5. Mounting Clips: Minimum 14 gage galvanized steel sheet stock.
6. Color: As selected by Architect.
7. Acceptable Manufacturer: Greenscreen, Los Angeles, CA.

2.2 MISCELLANEOUS MATERIALS

A. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS specifications, and as required for color match, strength, and compatibility in fabricated items.

B. Bituminous Paint: Cold-applied asphalt mastic, comply with SSPC Paint 12, for aluminum in contact with dissimilar metals.

C. Fasteners: Same basic metal as fastened metal, unless otherwise indicated.
1. Do not use metals that are corrosive or incompatible with materials joined.
2. Provide concealed fasteners for interconnection of decorative metalwork components and for their attachment to other work except where exposed fasteners are unavoidable or are standard fastening method.
3. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
4. Concrete Inserts: Furnish anchorage units to be placed in concrete substrate; of hot-dip galvanized cast-iron/malleable-iron body, design as indicated: ASTM A153 zinc coating, ASTM A47 casting.
5. Setting/Anchoring Cement: Nonshrinking, nonstaining, hydraulic-controlled expansion cementitious compound; factory prepackaged for mixing with water at project site for a pourable and trowellable mix; recommended by manufacturer for exterior exposure without protective coating, sealer, or waterproofing.
6. Accessories: Items necessary to achieve complete assembly and appearance depicted on Drawings.

2.3 FABRICATION

A. General:
1. Form decorative metalwork to required shapes and sizes, with true curves, lines, and angles.
2. Provide components in sizes and profiles indicated, but not less than required to comply with requirements for structural performance.
3. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work.
   a. Drill and tap for required fasteners.
   b. Use concealed fasteners wherever possible.
4. Comply with AWS for recommended practices in shop welding and brazing.
   a. Provide welds and brazes behind finished surfaces without distortion or discoloration of exposed side.
   b. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.

5. Joints:
   a. Mill joints to tight, hairline fit.
   b. Cope or miter corner joints.
   c. Form joints exposed to weather to exclude water penetration.
6. Finish exposed surfaces to smooth, sharp, well-defined lines and arrises.
7. Assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

2.4 WIRE ROPE VINE SYSTEM:

A. Stainless Steel Cables and Fittings shall be dimensioned and fabricated to specified size and labeled according to shop drawings and installer's specifications.

B. Preassemble items in shop to greatest extent practicable to minimize assembly at project site. Disassemble units only to extent necessary for shipping and handling limitations. Mark units for reassembly.

C. Finish:
   1. Clean and/or descale cables and fittings in accordance with ASTM A380.
   2. Passivate in accord with ASTM B912, to provide the following finish: 330 grain satin finish (equiv. to #4 satin finish).

2.5 GREENSCREEN

A. Forming:
   1. Factory form, uniformly dimension, one-piece lengths to avoid field cutting.
   2. Provide joint patterns indicated.

B. Bend, form, and drill components prior to powder coating finish.

C. Grind exterior surfaces smooth prior to powder coating finish.

D. Fabrication of panels on site not allowed.

E. Powder Coat Finish: Manufacturer's standard powder coating process.

2.6 ZINC-RICH PRIMER

A. Maximum Allowable Dry Time: 1 hour to touch; 12 hours to top coat.

B. Pigment Content: Minimum 63% zinc in dry film by weight.

C. Compatible with finish paint system specified in 099000.

D. Acceptable Products:
   1. Tnemec 94H_2O Hydro-Zinc (California) , Tnemec Co., Kansas City, MO.
   2. Carbo-Zinc 859 VOC, Carboline Company, St. Louis, MO.
   3. ZRC Zero VOC Galvanizing Compound, ZRC Products Company, Quincy, MA.

2.7 FINISHES

A. General:
   1. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
   2. Protect mechanical finishes on exposed surfaces from damage by applying strippable temporary protective covering prior to shipment.

B. Steel:
   1. Provide hot-dipped galvanized for all exterior steel.
   2. Galvanized Steel: Remove soluble and insoluble contaminants and corrosion. Sweep (Abrasive) Blasting per ASTM D6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).
   3. Preparation for Shop Priming:
      a. Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed decorative metalwork:
      b. Exteriors (SSPC Zone 1B): SSPC-SP 6 "Commercial Blast Cleaning."

C. Stainless Steel:
   1. No. 4 satin and No. 8 mirror polished finish as indicated conforming with NAAMM AMP 503.
   2. Protect finish with factory applied adhesive backed paper covering.
   3. Remove or blend tool and die marks and stretch lines into finish.
   4. Grind and polish surfaces to produce uniform, directional, textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify items provided by other Sections of Work are properly sized and located.

C. Examine supporting members to ensure surfaces are at proper elevation and are free from dirt or other deleterious matter.

3.2 PREPARATION

A. Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions, and directions for installing items having integral anchors that are to be embedded in concrete or masonry construction.

3.3 INSTALLATION

A. General:
   1. Install architectural decorative metal components in accordance with manufacturer's instructions, Section 017300 and approved shop drawings.
   2. Provide anchorage devices and fasteners where necessary for securing decorative metal items to in-place construction.
   3. Perform cutting, drilling, and fitting required to install decorative metalwork.
   4. Set products accurately in location, alignment, and elevation, plumb, level, and true, measured from established lines and levels.
   5. Fit exposed connections to form tight, hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers.
   6. Restore finishes to eliminate evidence of cutting, welding, and grinding.
   7. Do not cut or abrade finishes that cannot be completely restored in field. Return such items to shop for required alterations, followed by complete refinishing, or provide new units.
   8. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal-arc welding, for appearance and quality of welds made, and for methods used in correcting welding work.
      a. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations.
      b. Grind exposed welded joints smooth and restore finish to match finish of adjacent surfaces.

B. Stainless Steel Wire Rope:
   1. Shop assemble wire rope assemblies with fittings machine swaged.
   2. Minimize turnbuckle take up used for dimensional adjustment so maximum amount is available for tensioning wire ropes.
   3. Tag wire rope assemblies and fittings to identify installation locations and orientations.
   4. Install rope assemblies in accordance with manufacturer's instructions and the approved shop drawings.
   5. Provide anchorage devices and fittings to secure to in-place construction; including threaded fittings for concrete inserts, toggle bolts and through-bolts.
   6. Anchor rope assemblies to mounting surfaces as indicated on Drawings.
   7. Separate dissimilar materials with bushings, grommets or washers to prevent electrolytic corrosion.
   8. Use manufacturer's supplied mounting hardware.
   9. Terminate and tension cable system in accordance with manufacturer's instructions.
   10. Ensure ropes are clean, and without kinks or sags.

11. After final adjustment provide tamper resistant locktight materials on all fittings.

C. Greenscreen
1. Mount at heights and in positions indicated.
2. Secure to substrate with concealed clips and fasteners.
3. Tolerances:
a. Maximum Offset from True Alignment Between Adjacent Members Butting or In Line: 1/8 inch.
b. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.4 ADJUSTING

A. Touchup Painting: Immediately after erection, clean abraded areas of shop paint, and paint exposed areas with same material.

B. For galvanized surfaces, clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

3.5 PROTECTION

A. Protect finishes of decorative metalwork from damage during construction period with temporary protective coverings approved by decorative metalwork fabricator. Remove protective covering at time of Substantial Completion.

B. Restore finishes damaged during installation and construction so that no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit; or provide new units.

END OF SECTION

SECTION 057300

DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select locally or regionally fabricated products wherever possible.

1.2 42 INCHES DEFINITIONS

A. Guard: A building component or a system of building components located at or near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to a lower level.

B. Handrail: A horizontal or sloping rail intended for grasping by hand for guidance or support.

1.3 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Fabricator is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of handrail and railing systems.
   3. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   4. Provide concealed fastening wherever possible.

B. Structural Requirements: Provide assemblies which, when installed, comply with the following minimum requirements for structural performance:
   1. Handrails and Guards: Capable of withstanding following loads applied as indicated.
      a. Concentrated load of 200 pounds applied at any point along the top, in any direction, and have attachment devices and supporting structure to transfer this loading to appropriate structural elements of the building.
      b. Uniform load of 50 PLF applied in any direction at the top and to transfer this load through the supports to the structure.
      c. Concentrated and uniform loads above need not be applied simultaneously.

C. Interface with Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections of structure in installation.

1.4 SUBMITTALS

A. General: Submit following items under provisions of Section 013300.

B. Product Data:
   1. Submit product data for grout, glass, and finishes.

C. Shop Drawings:
   1. Indicate locations and complete fabrication details, materials, finishes, and installation details.
   2. Stamp shop drawings with seal and signature of professional engineer responsible for design.

D. Samples: Submit each type of metal finish and glass, where normal color and texture variations are to be expected, include two or more samples, showing limits of variation.

E. Submit following Informational Submittals:
   1. Support reactions design data.
   2. Certifications specified in Quality Assurance article.

3. Qualification Data: Engineer's, fabricator's, and welder's qualification data.
4. Manufacturer's instructions.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
a. Ornamental Railing Systems
2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
a. Ornamental Railing Systems.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
a. Ornamental Railing Systems

1.5 QUALITY ASSURANCE

A. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of handrail and railing systems.

B. Fabricator Qualifications: Company specializing in fabricating work specified in this Section with minimum 5 years documented experience.

C. Welder Qualifications: AWS certified within past 12 months for each type of weld required.

D. Certifications:
1. Submit certificates verifying AWS qualifications for each welder employed on Project.
2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
3. Engineering certifications.

1.6 MOCK-UPS

A. General: Comply with provisions of Section 014500.

B. Visual Mock-Up:
1. Construct mock-up 4 feet long as indicated directed.
2. Locate on site where directed by Architect.

1.7 DELIVERY, STORAGE AND HANDLING

A. Comply with provisions of Section 016000.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Blumcraft, A Division of CR Laurence, Los Angeles, CA. or a comparable product of one of the following:
1. Manufactured Structurally Glazed Railings:
a. Julius Blum and Company, Inc., Wood Ridge, NJ.
b. Lavi Industries, Valencia, CA.
c. Livers Bronze Company, Inc., Kansas City, MO.

2.2 MATERIALS

A. Steel:
1. Steel: Maximize use of recycled steel with minimum of 30 percent.
2. Tubing: ASTM A500 or A501
3. Plates, shapes and bars: ASTM A36.
4. Gray iron castings: ASTM A48, Class 30
5. Malleable iron castings: ASTM A47, Grade as recommended by fabricator for type of use indicated.

6. Use architecturally exposed steel.

B. Stainless Steel:
1. Pipe: ASTM A312, Grade TP304.
2. Tubing: ASTM A554, Grade MT 304.
3. Castings: ASTM A743, Grade CF-8 or CF-20.
4. Shapes: ASTM A276, UNS Number S30200 or S30400.
5. Sheets: ASTM A240, UNS Number S30200 or S30400.

C. D. Aluminum:
1. 1. Extruded Bar and Shape: ASTM B221, 6063 T6.

D. Glass:
1. Type: Tempered Safety Glass.
a. Standard: ASTM C1048, Kind FT, Condition A, Type I.
b. Color: Clear-Class 1.
c. Thickness: (1/2 inch).

E. Welding Electrodes and Filler Material: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, and as required for color match, strength, and compatibility in the fabricated items.

F. Bituminous Paint: Cold-applied asphalt mastic, comply with SSPC Paint 12, for aluminum railings.

G. Grout: Non-shrink, non-metallic, pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous.

H. Fasteners:
1. As recommended by manufacturer for conditions encountered.
2. Provide zinc-coated for exterior use.

2.3 COMPONENTS

A. Shoe: Blumcraft B5A, 2-11/16 inches wide by 4-3/16 inches high

B. Rail Cap: Blumcraft GRS 15, 1-1/2 inches wide by 1-1/2 inches tall.

C. Finish: Polished stainless steel cladding.

2.4 FABRICATION

A. General:
1. Verify dimensions on site prior to fabrication.
2. Fabricate to support design loads specified.
3. Fit and shop assemble in largest practical sizes.
4. Fabricate materials straight and true, without scratches, scars, creases, buckles, ripples, or chatter marks, free from surface blemishes.
5. Fabricate panels to appear visually flat.

B. Connections:
1. Structurally Glazed Railings: On handrail, provide inside profile sleeves at butt joints; exposed fasteners not permitted.

C. Brackets, Flanges, Fittings, and Anchors:
1. Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings and anchors for interconnection of handrail and railing members to other work.
2. For railing posts set in concrete, provide sleeves of stainless steel, not less than 6 inches long and with inside dimensions not less than 1/2 inch greater than outside dimension of post. Provide stainless steel plate closure welded to bottom of sleeves.

D. Joints: Mill to tight, hairline fit: Form joints exposed to weather to exclude water penetration.

E. Ends: Capped.

F. Anchors: Provide toothed steel or lead-shield expansion bolt devices for drilled-in-place anchors.

G. Bends: As detailed.

2.5 FINISHES

A. Stainless Steel:
   1. No. 4 satin and No. 8 mirror polished finish as indicated conforming with NAAMM AMP 503.
   2. Protect finish with factory applied adhesive backed paper covering.
   3. Remove or blend tool and die marks and stretch lines into finish.
   4. Grind and polish surfaces to produce uniform, directional, textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Coordinate setting drawings, templates, and instructions for installation of sleeves, concrete, inserts, and anchor bolts embedded in concrete or masonry.

3.2 INSTALLATION

A. Install in accordance with manufacturer’s recommendations.

B. Fit exposed connections to form tight, hairline joints.

C. Set work accurately in location, set posts and align to within 1/4 inch in 12 feet. Set rails horizontally or parallel to rake of steps or ramp to within 1/4 inch in 12 feet.

D. Do not weld, cut or abrade railings which have been finished after fabrication and are to be field connected by mechanical means.

E. Do not place masking tape or other similar materials to faces of glass or metal.

F. Anchoring Posts:
   1. Concrete:
      a. Anchor posts in concrete by means of sleeves preset and anchored into concrete.
      b. Fill annular space between posts and sleeves solid with non-shrink, non-metallic grout.
      c. Cover anchorage joint with a round metal flange.

G. Coat concealed surfaces of aluminum, which will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

H. Installation of Glass Panels:
   1. Structurally Glazed Railings: Install to comply with railing manufacturer's instructions to listed tolerances, beginning with attachment of base channel to building structure, followed by insertion and connection of factory-fabricated and assembled glass panels.

3.3 ADJUSTING AND CLEANING

A. Perform final cleaning under provisions of Section 017400.

B. Protect finishes of railings and handrails from damage during construction by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at project completion. Restore finishes damaged during installation and construction period.

3.4 PROTECTION

A. Protect finished installation under provisions of Section 017300.

END OF SECTION

DIVISION 06

WOOD, PLASTICS, AND COMPOSITES

SECTION 061000

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Wood blocking within building and on roof; panel equipment boards.

B. This project is a registered US Green Building Council “LEED” project.
   1. Wood framing and blocking shall be certified according to the guidelines of the Forest Stewardship Council.
   2. Sealants and Adhesives used within building must meet or exceed VOC limits of South Coast Air Quality Management District (SCAQMD) and Cal-GREEN requirements.
   3. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with LEED and Cal-GREEN Formaldehyde Limits requirements.
   4. Select locally or regionally fabricated products (within 500 miles of jobsite) wherever possible.

1.2 DEFINITIONS

A. Blocking: Wood used for plates, furring, shimming, stripping, sleepers, grounds, curbing, cants, bracing, nailers,, and filling in between framing members.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Provide product data on wood treatment materials; include historical performance information.

C. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Manufacturer's instructions for wood treatment materials.

D. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Adhesives and sealants.
   2. LEED Credit EQc4.4: Composite wood, plywood, and agri-fiber products shall contain no added urea-formaldehyde resins

1.4 QUALITY ASSURANCE

A. Grade Marks:
   1. Identify lumber and plywood by official grade mark.
   2. Lumber: Include symbol of grading agency, mill name, grade, species, grading rules, and condition of seasoning at time of manufacturer.
   3. Plywood: Include type, class identification index, and agency mark.
   4. Pressure treatment: Include quality mark of grading agency which maintains continued supervision, testing, inspection, and re-examination service over product quality as described in AWPA standards.
   5. Fire-retardant treated wood: Imprint each piece with mark attesting to FR-S rating.

B. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

B. Storage and Protection:
   1. Store products above ground, on platforms or skids, and covered with waterproof coverings.
   2. Store products with ventilation, drainage, and protection against damp or wet locations.
   3. Support products to prevent warping and distortion.

C. Fire-Retardant Treated Wood:
   1. Keep materials dry during delivery and storage.
   2. Protect against exposure to weather.

PART 2 - PRODUCTS

2.1 PLYWOOD

A. General: Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with LEED and Cal-GREEN Table 5.504.4.5 - Formaldehyde Limits requirements.

B. Grading Rules:
   1. PS-1 or APA PRP-108.
   2. Plywood Grading Agency: Certified by APA.
   3. Species Groups: 1 through 4, as required for span rating.

C. Uses, Grades, and Ratings:
   1. Equipment Panel Boards:
      a. Rated Sheathing.
      b. Exposure 1.
      c. Grade: C-D.
      d. Thickness: 23/32 inches minimum.

2.2 FASTENERS

A. Provide fasteners in sizes, spacings, and locations to suit applications.

B. Provide hot-dipped galvanized or stainless steel fasteners for use with preservative treated and fire-retardant treated wood and for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.

C. Anchors:
   1. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
   2. Eyebolts: ASTM A489.
   3. Machine Screws: ASME B18.6.3.
   4. Lag Bolts: ASME B18.2.1.
   5. Wood Screws: Flat head, ASME B18.6.1.
   6. Plain Washers: Round, ASME B18.22.1.
   7. Lock Washers: Helical, spring type, ASME B18.21.1.
   8. Masonry Anchorage Devices: Expansion shields.
   9. Toggle Bolts: Tumble-wing type, class and style as required.

2.3 WOOD TREATMENTS

A. Fire Retardant Pressure Treatment:
   1. Description:
      a. AWPA C27 for interior plywood.
      b. Hygroscopicity: Provide fire retardant treated wood and plywood rated as Interior Type A High Temperature (HT) in accordance with Sections 2.2.2.1 of AWPA C20/C27 when tested at 92% relative humidity.
      c. Use Exterior Type where necessary for exterior locations.
      d. Chemically treat and pressure impregnate wood products.
      e. Capable of providing a maximum flame spread/smoke development rating of 25/25 (FR-S Rating).
      f. Not required to have brush treatment of cuts made in the field.
      g. Equilibrium moisture content of not more than 28 percent when tested in accordance with ASTM D3201 procedures at 92 percent relative humidity.

h. Not detrimental to structural properties of plywood when exposed to elevated temperatures and high humidity when tested in accordance with ASTM D5516.
i. Not capable of bleeding through or adversely affecting type of finish indicated.
j. Not capable of corroding metals when tested in accordance with MIL-L-19140E.

2. Acceptable Products and Manufacturers, Interior:
   a. D-Blaze, Chemical Specialties, Inc., Charlotte, NC.
   b. Dricon FRT, Arch Wood Protection, Smyrna, GA.
   c. Pyroguard, Hoover Treated Wood Products, Thomson, GA.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Site Verification of Conditions:
   1. Verify end supports are ready to receive framing.
   2. Before installation, check members for damage, and proper dimensions.

3.2 CONSTRUCTION

A. General:
   1. Construct plumb, level, true to line, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
   2. Comply with AFPA NDS for attaching to substrates by anchoring and fastening to draw and securely hold members rigidly in place.
   3. Install fasteners at spacings required by more stringent requirements of AFPA NDS or applicable building code.
   4. Comply with APA E30 requirements for plywood.
   5. Discard Material:
      a. With defects which might impair quality of work.
      b. Which are too small to fabricate work with minimum joints or optimum joint arrangement.
   6. Scribe, cope, and construct members accurately cut and fitted.
   7. Make tight connections between members to develop full member strength.
   8. Locate members as indicated. Do not change size, spacing, or spans without Architect's specific approval. Take care to place species and grades of members where indicated.
   9. Cut, notch, or bore members for passage of pipes and conduits in accordance with AFPA WCD. Reinforce members by use of formed sheet metal accessories.
   10. Fasteners:
      a. Use washers under bolt heads and nuts.
      b. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials.
      c. Install fasteners without splitting wood; predrill as necessary.
   11. Fire Retardant Treated Wood:
      a. Do not rip cut.
      b. Do not mill.
      c. Only end cuts and bored holes are permitted.

3.3 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect products from moisture absorption and subsequent warping or deterioration until subsequent construction can proceed.

END OF SECTION

SECTION 061643

GYPSUM SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior wall sheathing.
   2. Sheathing joint and penetration treatment.

B. Related Sections:
   1. Section 042000 – Unit Masonry.
   2. Section 054100 – Structural Metal Stud Framing.
   3. Section 072736 – Air Barriers.
   4. Section 092214 - Furring and Lathing: Plaster grounds and lath.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Provide for exterior sheathing; include historical performance information.

1.3 QUALITY ASSURANCE

A. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with Section 016000.
   1. Storage and Protection:
      a. Store products above ground, on platforms or skids, and covered with waterproof coverings.
      b. Store products with ventilation, drainage, and protection against damp or wet locations.

PART 2 - PRODUCTS

2.1 GLASS FIBER FACED GYPSUM SHEATHING

A. Glass Fiber Faced Gypsum Sheathing:
   1. Locations: Exterior walls and ceilings of metal framing.
   2. Glass Fiber Faced Gypsum Sheathing, ASTM C1177.
   3. Thickness: 5/8 inch.
   4. Type X for fire-rated assemblies and locations where indicated; regular type at other assemblies.
   5. Flame spread and smoke developed, when tested in accordance with ASTM E84: 0.

B. Acceptable Products and Manufacturers:
   1. G-P Dens-Glass Gold Exterior Sheathing, Georgia-Pacific Corporation, Atlanta, GA.
   2. e^2XP Extended Exposure Sheathing, National Gypsum, Charlotte, NC.
   3. Securock Glass-Mat Sheathing, USG, Chicago, IL.

2.2 ACCESSORIES

A. Sealant at Glass Fiber Faced Gypsum Sheathing: Silicone—General Purpose (Designation S-GP): ASTM C920, Type S, Grade NS:
   1. Class: 50. Joint movement range without cohesive/adhesive failure: Plus 50 percent to minus 50 percent of joint width.
   2. Uses: NT, M, G, A, O
   3. Low modulus, single component, neutral curing, non-staining, non-bleeding silicone sealant.
   4. Color: Manufacturer standard.
   5. Acceptable Products:
      a. 795, Dow Corning.

b. Silpruf, General Electric, Waterford, NY.
c. Rhodorsil 5C, Rhone-Poulenc, Inc. Monmouth Junction, NJ.

B. Fasteners: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a saltspray resistance of more than 800 hours according to ASTM B 117.

C. Fluid Applied Air Barrier: Refer to Section 072726.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.
1. Verify sheathing ends will be supported on framing.
2. Before installation, check members for damage, and proper dimensions.

3.2 INSTALLATION

A. General: Construct plumb, level, true to line, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
1. Provide compatible sealant system between sheathing and adjacent construction.
2. Seal locations necessary to create and secure continuous enclosure even though Drawings may not indicate all locations; do not seal weep holes.
3. Seal to prevent migration of water, vapor, and air through joints within sheathing and between sheathing and adjacent construction.

B. Glass Fiber Faced Gypsum Sheathing: Erect horizontally, with edge butted tight and ends occurring over framing member. Space framing members at not more than 16 inches on center.
1. Secure to steel framing with bugle head steel screws to each support in accordance with manufacturer's recommendations but with fasteners spaced at not more than 8 inches on center vertically.
2. Apply continuous bead of silicone sealant at joints and terminations; trowel flat to establish water tight condition.

3.3 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect products from moisture absorption and subsequent warping or deterioration until subsequent construction can proceed.

END OF SECTION

SECTION 062013

FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Solid-sawn exterior wood decking on sleepers.
   2. Wood benches.

B. Related Sections:
   1. Section 061000 – Rough Carpentry.
   2. Section 061500 – Wood Roof Decking.

1.2 SUBMITTALS

A. General: Submit in accordance with General Conditions.

B. Product Data: Submit manufacturer's descriptive literature and technical data on products proposed for use including the following:
   1. Wood decking and support members
   2. Wood bench material and support members
   3. Fasteners

C. Samples: Provide 2 of each type and species of lumber with applied finish.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of wood decking to avoid extended on-site storage and to avoid delaying the Work.

B. Do not deliver shop fabricated carpentry until job site conditions and operations which could damage, soil or deteriorate work are complete.

PART 2 PRODUCTS

2.1 LUMBER, GENERAL

A. General: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Grade Stamps: Factory mark with grade stamp of inspection agency on surfaces that will not be exposed to view.

C. Moisture Content: Provide wood decking with 19 percent maximum moisture content at time of dressing.

2.2 SOLID-SAWN WOOD

A. Sleepers: Hem-fir, ACQ, No. 2 pressure treated. Size indicated on Drawings.

B. Board Decking and Benches: Square-edged milled S4S boards, with one face free of planer skip, machine burn, and torn or chipped grain.
   1. Species: IPE.
   2. Size and Thickness: As indicated on Drawings.
   3. Install over 2x pressure treated framing (sleepers).
   4. Grade Characteristics:
      a. Clear.
      b. No decay, incipient decay, honeycomb, knot holes, shakes, splits, or wane.
      c. No discoloration.

2.3 ACCESSORIES

A. Wood bench support assembly per Drawing Details.

2.4 FASTENERS

A. Fasteners for Wood Decking: Provide fastener size and type complying with decking standard for thickness of deck used.
   1. Hidden Deck Fasteners: Ipe Clip Extreme Fastener System.
   2. Gap Spacing: 1/8" gap between the installed deck boards.
   3. Color: As selected by Architect to match decking.

B. Bolts for Anchoring Wood Benches: Stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with General Conditions.

B. Verify areas are ready to receive work and field measurements are as shown on shop drawings.

3.2 INSTALLATION

A. Solid-Sawn Wood Decking: Install to comply with manufacturer's instructions, spacing, and structural loading requirements.

B. Horizontal and Vertical Installations: First and last boards require a plugged attachment for the open end.

C. Wood Deck Installation:
   1. Lay out wood deck system, including supporting structure, in locations and patterns as shown.
   2. Place wood deck and securely fasten to sleepers with stainless steel hidden deck fastener system.
   3. Remove all burrs and splinters.

D. Fasteners: Install per manufacturer's requirements.

E. Repair damaged surfaces and finishes after completing erection. Replace damaged decking if repairs are not approved by Architect.

3.3 INSTALLATION, BENCHES

A. General: Install work in accordance with approved shop drawings.

B. Tolerances:
   1. Set and secure materials and components, rigid, plumb, and square.
   2. Maximum offset from true alignment with abutting materials: 1/32 inch unless otherwise specified or required by AWS grade.
   3. Maximum Variation from True Position: 1/16 inch unless otherwise specified or required by AWS quality grade.

C. Shim as required using concealed shims.

D. Cut to fit to exact size. Where woodwork abuts other finished work, scribe and cut for accurate fit. Where necessary to fit at site, provide ample allowance for cutting and fitting.

E. Drill pilot holes at corners before making cutouts.

F. Use finishing nails where exposed.

G. Secure woodwork to anchors, built-in blocking, or directly attach to substrates.

END OF SECTION

SECTION 064116

PLASTIC LAMINATE CLAD WOOD CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. This project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled materials.
   2. Select locally or regionally fabricated products wherever possible.
   3. Select adhesives and sealants meeting LEED requirements.
   4. Wood framing and blocking shall be certified according to the guidelines of the Forest Stewardship Council.
   5. Use of “certified wood” means use of minimum of 50 percent of wood-based materials certified in accordance with the Forest Stewardship Council (FSC) Guidelines for wood building components, including but not limited to framing materials, wood blocking, curbs, cants, nailers, furring, grounds, pedestrian barriers, concrete formwork, and equipment backing boards.
   6. Select core board materials to maximize use of rapidly renewable materials.
   7. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with LEED and Cal-GREEN Formaldehyde Limits requirements.

1.2 DEFINITIONS

A. Comply with applicable provisions of *Architectural Woodwork Standards* (AWS), 1st Edition, October 2009, as adopted and published by Architectural Woodwork Institute and the Woodwork Institute.

B. HPDL: High pressure decorative laminate (Plastic Laminate or PLAM).

C. Exposed: As used in this Specification Section, "exposed" portions of casework include surfaces visible when doors and drawers are closed. Bottoms of casework more than [(4’-0")] above finish floor are considered exposed. Visible surfaces in open casework or behind clear doors also are considered as exposed.

D. Semi-Exposed: As used in this Specification Section, "semi-exposed" portions of casework include those members behind opaque doors, such as shelves, divisions, interior faces of ends, case backs, drawer sides, backs and bottoms, and back face of doors. Tops of cases 6’-6" or more above finish floor shall be considered semi-exposed.

1.3 PERFORMANCE REQUIREMENTS

A. Wall mounted cabinets: Able to withstand minimum cabinet-to-wall connection load of not less than 60 pounds per linear foot.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Manufacturers specifications and installation instructions for hardware and accessory items.

C. Shop Drawings:
   1. Indicate elevations, profiles, sections, and views of casework fabrications at scale large enough to permit checking for design conformity 3/4 inch = 1 foot for full sections, and 3 inch = 1 foot for details.
   2. Show sizes, thicknesses, quantities, markings, materials, finishes, accessories, hardware, and locations of each item.
   3. Include assembly and installation drawings to show methods of wood blocking, fastening, bracing, jointing, and connecting to work of other trades.
   4. Indicate dimensions necessary for fitting casework and adjacent equipment and appliances to fixed planes.

5. Indicate cut-out locations.
6. Coordinate mechanical and electrical devices and other items occurring in casework.
7. Submit shop drawings with Woodwork Institute (WI) Certified Compliance Certificate.

D. Samples:
1. HPDL: 8-1/2 by 11 inches on panel backing for each color, texture, and pattern; include manufacturer's name and pattern number.
2. Exposed and Semi-Exposed Cabinet Hardware: One set of each type and finish.

E. Informational Submittals:
1. Certifications specified in Quality Assurance article.
2. Qualification Data: Fabricator's qualification data.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
   a. Rapidly renewable products.
   b. Certified wood.
2. LEED Credit MRc4 - Recycled Content: Submit certification/letter from material manufacturer indicating percentage of recycled content.
3. LEED Credit MRc5 Location of Extraction, Harvest, and Manufacture: Submit documentation identifying location of extraction, harvest, and manufacture for materials supplied under this section.
4. LEED Credit MRc6: Provide documentation certifying use of rapidly renewable materials for the following materials:
   a. Agrifiber panels
   b. Wood veneer
5. LEED Credit MRc7: Provide documentation certifying the percentage of wood based products harvested from a FSC forest.
   a. Wood
   b. Provide wood certification submittal documentation including chain-of-custody documentation for all wood based materials installed.
   c. Provide a spreadsheet of all wood based products used on the project highlighting certified wood based material and include calculations demonstrating that 50% of wood based materials are certified wood.
   d. Include statement indicating total cost for wood-based materials used for Project, including non-rented temporary construction.
6. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
   a. Adhesives and sealants.
7. LEED Credit EQc4.4: Composite wood, plywood, and agri-fiber products shall contain no added urea-formaldehyde resins.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Fabricator is responsible for finishing and installation of casework specified in this Section.

B. Fabricator Qualifications: Company specializing in fabrication, finishing, and installation of quality casework having minimum of 5 years documented experience under current legal name.

C. Certifications: Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.

D. Fabrication and Installation Standards: Fabricate and install in accordance with Architectural Woodwork Standards, Edition 1 as listed below.
1. Lumber grades: AWS Section 3.
2. Panel products: AWS Section 4.
3. Standing and running trim: AWS Section 6.

4. Casework: AWS Section 10.
5. Countertops: AWS Section 11.
6. Installation: AWS Appendix B - 12.

E. Woodwork Institute (WI) Certification:
1. Millwork, casework and cabinetwork shall be manufactured in accordance with standards established in the Architectural Woodwork Standards, Latest Edition, published jointly by the Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturer's Association of Canada, in grade or grades herein specified or as shown on Drawings.
2. Before delivery to jobsite, woodwork supplier shall submit Woodwork Institute Certified Compliance Certificate indicating millwork products being supplied and certifying that products fully meet the requirements of Grade or Grades specified.
3. Each elevation of casework, each laminated plastic top, and each solid surface top shall bear Woodwork Institute Certified Compliance Label.
4. At completion of installation, woodwork installer shall provide Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
5. All fees charged by the Woodwork Institute for their Certified Compliance program are responsibility of millwork manufacturer and/or installer and shall be included in their bid.
6. The foregoing shall not be construed to limit power and authority of Owner to reject any millwork which does not in Owner's opinion meet with any one or more of the specifications of this Contract.

1.6 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

B. Protect materials from damage, soiling, and deterioration during transit and storage.

C. Do not deliver casework materials until Project site conditions and operations which could damage, soil, or deteriorate work are complete.

D. Store products and materials in ventilated, interior locations under constant minimum temperature and relative humidity recommended by casework manufacturer.

1.7 PROJECT CONDITIONS

A. Environmental Requirements: Obtain and maintain temperature and moisture conditions as recommended by casework fabricator for storage and installation, including remainder of construction period.

B. Field Measurements:
1. Field measure conditions where casework is indicated to be fitted to other construction prior to fabricating work of this Section.
2. Show final field measurements on shop drawings.
3. Where field measurements cannot be made without delaying Project, coordinate dimensions among trades to ensure proper fit of casework.

1.8 WARRANTY

A. Comply with provisions of Section 017800.

B. Furnish warranty with provisions for repairing or replacing, at no additional cost to Owner, casework items that exhibit defects in material or workmanship for 2 years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. High Pressure Decorative Laminate (HPDL):
1. Quality Standard: Comply with NEMA LD-3.
2. Acceptable Products and Manufacturers:
a. Formica, Formica Corporation, Cincinnati, OH.
b. Nevamar, International Paper Decorative Products, Odenton, MD.

c. Pionite, Pioneer Plastics Corporation, Auburn, ME.
d. Wilsonart, Wilsonart International, Inc., Temple, TX.

B. Plastic Laminate Backing Sheets: High Pressure laminate of paper, without decorative finish, 0.020 inch thick.

C. Melamine:
1. Composition: High Pressure laminate of paper, with decorative finish, 0.020 inch thick.
2. Color: White.

D. Softwood Lumber: Comply with PS 20.
1. Maximum Moisture Content: 6 percent.
2. Species: Douglas fir, hemlock, Ponderosa pine, or Sugar pine.
3. General: Provide wood from an FSC certified source.
4. Provide cores from rapidly renewable source.

E. Core Substrate: Contractor option of particleboard, MDF or Agri-fiber particleboard as specified below.

F. Particleboard:
1. Comply with ANSI A208.1, phenolic resin particleboard.
2. No added urea formaldehyde.
3. General Purpose: Type 1-M-1.
4. Water Resistant: Type 2-M-2 or 2-M-3.
5. Fire Retardant:
a. Comply with ANSI A208.1, phenolic resin particleboard Type 1-M-1.
b. Surface Burning Characteristics: Flame spread 20, smoke development 25, ASTM E84.
c. Acceptable Product: Duraflake FR, Willamette Industries, Albany, OR.

G. Medium Density Fiberboard (MDF): ASTM D1037 and ANSI A208.2, Classification M-3.
1. Formaldehyde free material.
2. Fire retardant treated, Class I or Class A rating.
3. Density: Minimum of 48 PCF.
4. Provide through-color material as selected by Architect where indicated for countertops.
5. Thickness:
a. Panel structural components: Minimum 3/4 inch thick.
b. Back Panels, Drawer Components, and Drawer Bottoms: Minimum 1/2 inch thick.
c. Fixed Shelves, Dividers, Mounting Stretchers: Minimum 3/4 inch thick.
d. Semi-exposed Adjustable Shelves in Cabinets under 36 inches Wide: Minimum 3/4 inch thick.
e. Shelves in Cabinets 36 inches Wide or Greater: Minimum 1 inch thick.
6. Acceptable Product: Medite FR, Medite Corporation, Medford, OR.

H. Agri-Fiber Particleboard: ANSI A208.1, Classification M-3 equivalent. Wheat/straw composition. Chopped fibers set in MDI resin.
1. Thickness: 3/4 inch.
2. Internal Bond: 90 psi.
3. Modulus of Rupture: 2700 psi.
4. Hardness: 600 pounds.
5. Screw Hold:
a. Face: 250 pounds.
b. Edge: 230 pounds.
6. Formadehyde free.
7. Acceptable Products and Manufacturers:
a. Woodstalk, Dow BioProducts, Elie, Manitoba, Canada.
b. Naturall Fibre, LLC, Minneapolis, KS.

I. Hardboard:
1. Grade: Tempered.
2. Face: Both faces sanded.
3. Thickness: 1/4 inch.

J. Hardware:
1. Drawer Slides:
   a. General: Steel ball-bearing, full extension, 75 pound capacity minimum, drawer hold-in closed position.
   b. Acceptable Manufacturers:
      1) Accuride, Santa Fe Springs, CA.
      2) Hettich America LP, Alpharetta, GA.
      3) Hafele.
2. Heavy-duty Lateral Drawer Slides:
   a. General: Steel ball-bearing, full extension, 150 pound capacity minimum drawer hold-in closed position.
   b. Acceptable Manufacturers:
      1) Accuride, Santa Fe Springs, CA.
      2) Hettich America LP, Alpharetta, GA.
      3) Hafele.
3. Computer Keyboard Drawer Slides:
   a. General: Undercounter, 75 pound capacity minimum, hold-out position.
   b. Acceptable Manufacturers:
      1) Accuride, Santa Fe Springs, CA.
      2) Hettich America LP, Alpharetta, GA.
      3) Hafele.
4. Hinges:
   a. General: Concealed "European" style, 95 degree opening.
   b. Acceptable Manufacturers:
      1) Julius Blum Company, Inc., Wood Ridge, NJ.
      2) Grass America, Inc., Kernersville, NC.
      3) Stanley Hardware, New Britain, CT.
5. Wire pulls:
   a. General: 4 inch center to center.
   b. Finish: Clear anodized aluminum.
   c. Acceptable Manufacturers:
      1) Engineered Products Company, Flint, MI.
      2) Stanley Hardware, New Britain, CT.
      3) HB Ives, Wallingford, CT.
      4) Triangle Brass Manufacturing Company, Los Angeles, CA.
6. Cabinet Locks: Provide as noted.
   a. General: Pin tumblers, surface mounted.
   b. Finish: US26D.
   c. Acceptable Products and Manufacturers:
      1) Yale Locks and Hardware, Charlotte, NC.
      2) Best Lock Corporation, Indianapolis, IN.
      3) National Cabinet Lock, Mauldin, SC.
7. Drawer Locks: Provide as noted.
   a. General: Disc or pin tumbler, surface mounted.
   b. Finish: US26D.
   c. Acceptable Products and Manufacturers:
      1) Yale Locks and Hardware, Charlotte, NC.
      2) Capitol Hardware Manufacturing Company, Inc., Niles, MI.
      3) Knape and Vogt Manufacturing, Grand Rapids, MI.
8. Shelf Support Pins:
   a. Nickel Steel.
   b. Location: 4 per shelf.
   c. Acceptable Products and Manufacturers:
      1) Hafele 282.04.711.
      2) Knape & Vogt 333.
      3) Lamp SS 323.

9. Shelf Standards and Supports:
   a. General: Steel, recessed mounted, adjustable on 1/2 inch centers. Clip type supports.
   b. Finish: Color finish selected by Architect.
   c. Acceptable Products and Manufacturers:
      1) Knape and Vogt Manufacturing, Grand Rapids, MI.
      2) Capitol Hardware Manufacturing Company, Inc., Niles, MI.
10. Grommets:
   a. General: 1-1/2 inch hole, black.
   b. Acceptable Products and Manufacturers:
      1) Doug Mockett and Company, Inc., Manhattan Beach, CA.

2.2 ACCESSORIES AND TREATMENTS

A. Contact Adhesive:
   1. Type recommended by casework fabricator to suit application.
   2. Resorcinol resin adhesive for fire rated construction.

B. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 , Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements [on the interior of the building].
   1. Current requirement refers to the date on which the materials are installed in the building.
   2. A copy of SCAQMD Rule #1168 is referenced in Section 018113 that was current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

C. Fasteners: Size and type to suit application.

D. Sealer:
   1. Benjamin Moore: Sanding Sealer Clear No. 253.
   2. Fuller O'Brien: Super Nap Seal and Finish No. 255-04.
   3. Glidden: Ultra-Hide Quick Dry Sanding Sealer No. Y-5035.
   4. PPG: Speedhide Alkyd Sanding Sealer, 6-10.

2.3 FABRICATION

A. General:
   1. Do not locate joints within 2 foot of sink cut-out.
   2. Cap exposed edges with laminate, except where indicated otherwise.
   3. Deliver to site in units sized for ease for handling and to permit passage through building openings.
   4. Prime with sealer concealed and semi-concealed surfaces. Brush apply only.
   5. Provide cutouts for plumbing fixtures, hardware, inserts, appliances, electrical work, and other fixtures. Verify locations of cutouts from site dimensions. Seal or prime paint contact surfaces of cutouts.
   6. Route or groove back of flat trim members, kerf backs of other wide flat members except plywood members.
   7. Apply laminate finish in full, uninterrupted sheets of maximum practical lengths. Form corners and butt joints with hairline joints.

B. Construction:
   1. Base Cabinets:
      a. Use finished end panels unless condition will be fully concealed.
      b. Provide finished toe space fronts, finished to match cabinet front.
   2. Wall Cabinets:
      a. Provide finished end panels unless condition will be fully concealed.
      b. Provide continuous 1 inch by 3 inch anchor cleat at top and bottom of cabinet interior full width of unit. Secure cleat in rabbet over back, then glue and spot pin.
   3. Countertops:
      a. Provide with 2 inch deep face edge, faced with high pressure laminate unless noted or shown otherwise.

b. Provide loose 4 inch high pressure laminate covered splashes typically at countertops unless taller splashes shown or noted.

4. Shelving:
   a. 3/4 inch thick up to 36 inch unsupported length.
   b. 1 inch thick for over 36 inch unsupported lengths.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that blocking is in place before beginning work.

C. Verify that field measurements are as shown on shop drawings.

D. Verify that mechanical, electrical, and other items affecting work of this section are in place and ready to receive the work.

E. Verify building HVAC systems are operating and temperature and moisture conditions as recommended by woodwork fabricator for installation have been achieved and will remain in effect for remainder of construction period.

3.2 PREPARATION

A. Seal concealed surfaces and items or assemblies which will be in contact with cementitious materials or surfaces.

B. Make field cuts with extreme care to avoid splintering.

3.3 INSTALLATION

A. General:
   1. Install in accordance with Section 017300 and approved shop drawings.
   2. Install work in accordance with specified AWS quality standards and AWS Appendix B - 12.
   3. Distribute defects allowed in quality grade to best overall advantage when installing Project assembled woodwork items.
   4. Shim as required using concealed shims.
   5. Before making cutouts, drill pilot holes at corners.
   6. Tolerances for field assemblies and joined items:
      a. Maximum Variation from True Position: 1/16 inch unless otherwise specified or required by AWS grade.
      b. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch unless otherwise specified or required by AWS grade.
   7. Set and secure casework and components. Use joint fasteners to align and secure adjoining cabinets and countertops. Affix base cabinets to floor.
   8. Secure to anchors, built-in blocking, or directly attach to substrates where capable of adequately supporting load. Use toggle bolt type fasteners for wall mounted components. Secure countertops to base cabinets.
   9. Install hardware in accordance with manufacturer's recommendations. Adjust and leave in proper working order.

B. Field Fitting:
   1. Cut to fit and carefully scribe.
   2. Where work abuts other finished surfaces, scribe and cut for accurate fit.
   3. Do not use overlay trim pieces to cover joints.

3.4 CLEANING AND PROTECTION

A. Protect casework from marring, defacement, or other damage until final completion.

B. Clean spaces of debris and vacuum and wipe down casework. Leave in condition ready for use.

END OF SECTION

SECTION 068200

GLASS FIBER REINFORCED PLASTIC (FRP)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass fiber reinforced plastic panels used to face other substrates.
   2. Manufacturer's associated accessories for attachment and trim.

B. Related Sections:
   1. Section 092900 - Gypsum Board.

C. This project is a registered US Green Building Council "LEED" project.
   1. Select locally or regionally fabricated products wherever possible.
   2. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
   3. Adhesives shall meet or exceed the VOC and chemical component limits of SCAQMD and Cal-GREEN VOC Limit requirements.
   4. Verify if a local plant (within 500 miles of jobsite) can supply the product.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit manufacturer's descriptive data and maintenance instructions; include recommended cleaning materials, application methods and precautions in use of cleaning materials which may be detrimental to surface if improperly applied.

C. Samples: Furnish sample 9 inch by 9 inch for each color selected.

D. Certification: Certify that materials comply with Specification and Health Department requirements.

E. Closeout Submittals
   1. Project Record Documents: Submit under provisions of Section 017800.
   2. Maintenance Data: Submit manufacturer's printed, recommended maintenance instructions including cleaning materials.
   3. Warranty: Submit specified product warranty in accordance with Section 017800.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. FRP Panels
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. FRP Panels
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. FRP Panels
   4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
      a. Adhesives

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Experienced applicator approved by manufacturer of material supplied having 1 year minimum experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Take care to prevent damage during delivery and handling.

C. Store panels in undamaged condition as packaged by manufacturer with seals and labels intact.

D. Store materials in clean, dry storage area.

1.5 PROJECT CONDITIONS

A. Maintain temperature for 72 hours before, during, and 48 hours after application.

1.6 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Provide written guarantee against delamination.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Pebble Textured Class A Fire Rated Panel Products and Manufacturers:
   1. Sequentia Structoglas FRFR Class A FRP Wall Panels, Crane Composites, Inc., Channahon, IL.
   2. Fire-X Glasbord with Surfaseal, Crane Composites, Inc., Channahon, IL.
   3. Marlite FRP Series P Class A, Marlite, Dover, OH.

2.2 GLASS FIBER REINFORCED PLASTIC PANELS

A. Wall Panels: Glass fiber mat embedded in organic resin. Typical physical properties include:
   1. Surface Texture: Embossed.
   2. Thickness: 0.09 inch.
   3. Flexural Strength: ASTM D790, 8,800 PSI.
   4. Tensile Strength: ASTM D638, 5,700 PSI.
   5. Impact Strength (IZOD): ASTM D256, 7.7 FT-LBS/IN.
   6. Barcol Hardness: ASTM 2583, 30.
   7. Water Absorption at 24 hours: ASTM D570, 0.16 percent at 77 F.
   8. Flame Spread: 25 or less.
   9. Smoke Developed: 450 or less.

B. Accessories:
   1. Walls: Provide battens, clips, adhesives, and fasteners as recommended by manufacturer for conditions encountered and as necessary to obtain Health Department acceptance where necessary.
   2. Adhesives: As directed by manufacturer for substrate and use conditions shown.
   3. Sealant: Silicone. See Section 079200.
   4. Adhesives & Sealants: Only use adhesives and sealants that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.
      a. Current requirement refers to the date on which the materials are installed in the building.
      b. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Examine substrate surfaces and correct defects before beginning work.

C. Verify other trade work that penetrates substrate has been completed before beginning installation.

3.2 INSTALLATION

A. Install in strict compliance with manufacturer's instructions.

B. Follow manufacturer's printed instructions for installation of wall panels to ensure a smooth, plumb, and level surface.

C. Securely laminate covering to walls in accordance with manufacturer's instructions.

END OF SECTION

DIVISION 07

THERMAL AND MOISTURE PROTECTION

SECTION 07 13 55

THERMOPLASTIC SHEET WATERPROOFING WITH ACTIVE POLYMER CORE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes thermoplastic sheet waterproofing with self-sealing backup waterproofing layer at below-grade kitchen foundation walls, including accessory components.

B. Refer to Section 07 17 16 “Bentonite Composite Sheet Waterproofing” for waterproofing at the balance of below-grade walls and at below-grade pit walls and under-slab.

C. Prior to ordering materials, contractor shall submit water samples to manufacturer for review, allow time for manufacturer review of samples, and distribute water sample test results to Owner and Consultant.

1.2 RELATED REQUIREMENTS

A. Section 07 17 16 “Bentonite Composite Sheet Waterproofing” for below-grade waterproofing at the balance of below-grade foundation walls.

1.3 REFERENCE STANDARDS

A. General: Standards referenced in this Section shall be most current standard by the testing agency referenced.

B. American Society for Testing and Materials (ASTM)

1. ASTM A 240/240M: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A 666: Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM C 109: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
4. ASTM C 203: Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
5. ASTM C 272: Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
6. ASTM C 518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
7. ASTM C 920: Standard Specification for Elastomeric Joint Sealants
8. ASTM C 1330: Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
9. ASTM D 696: Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer.
10. ASTM D 751: Standard Test Methods for Coated Fabrics.
11. ASTM D 1621: Standard Test Method for Compressive Properties Of Rigid Cellular Plastics
12. ASTM D 1709: Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
13. ASTM D 2136: Standard Test Method for Coated Fabrics-Low-Temperature Bend Test.
14. ASTM D 4833: Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
15. ASTM D 5385: Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
16. ASTM E 96: Standard Test Methods for Water Vapor Transmission of Materials.
17. ASTM E 154: Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
18. ASTM E 1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.4 PREINSTALLATION MEETINGS

A. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field installation to establish procedures to maintain required working conditions and to coordinate this work with related and adjacent work. Verify that final waterproofing and waterstop details comply with waterproofing manufacturer's current installation requirements and recommendations. Meeting attendees should include representatives for the Owner, Architect, inspection firm, Contractor, waterproofing contractor, concrete contractor, excavating/backfill contractor, and mechanical and electrical contractors if work penetrates the waterproofing.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product specified.

B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Installer Certificates: Submit certificate(s) signed by manufacturer certifying installer meets installer qualification requirements.

D. Manufacturer Certificates: Submit certificate(s) signed by manufacturer certifying manufacturer meets manufacturer qualification requirements.

E. Material Certificates: Submit certificate(s) signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements. Submit certification that waterproofing system and components, drainage and protection materials are supplied by a single-source manufacturer.

F. Sample warranties.

1.6 QUALITY ASSURANCE

A. The Waterproofing Contractor shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:
   1. Certification or license by the membrane manufacturer as a locally based, authorized applicator of the product the installer intends to use, for a minimum of five (5) years.
   2. List of at least three (3) projects, satisfactorily completed within the past five (5) years, of similar scope and complexity to this project. Previous experience submittal shall correspond to specific membrane system proposed for use by applicator.

B. Manufacturer Qualifications: Waterproofing membranes and all accessory products shall be provided by a single manufacturer with experience in the direct production and sales of waterproofing systems. Manufacturer shall be capable of providing field service representation during construction, approving an acceptable installer, and recommending appropriate installation methods.

C. Source Limitations: Obtain components for membrane waterproofing system from same manufacturer as membrane waterproofing or approved by membrane roofing manufacturer.

D. Water Sample Test: Contractor shall supply project site water sample to waterproofing membrane manufacturer for analysis. Manufacturer shall conduct test. Contractor is responsible for collection and shipment of one liter of actual site water. Water should be shipped in uncontaminated, sealed plastic container to the manufacturer.

E. Owner shall make all arrangements and payments for an independent inspection service to monitor waterproofing material installation compliance with the project Contract Documents and manufacturer’s published literature and site specific details. Independent inspection firm shall be approved by the waterproofing manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling: Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from

construction operation related damage, as well as, damage from weather, excessive temperatures and prolonged sunlight. Remove damaged material from site and dispose of in accordance with applicable regulations.

B. Storage: Do not double-stack pallets during shipping or storage. Protect waterproofing materials from moisture, excessive temperatures and sources of ignition. Provide cover, top and all sides, for materials stored on-site, allowing for adequate ventilation. Canvas tarps are recommended.

1.8 FIELD CONDITIONS

A. All new and temporary construction, including equipment and accessories, shall be secured in such a manner, at all times, as to preclude wind blow-off, damage or theft.

B. Temporary waterstops shall be installed at the end of each day's work, and shall be removed before proceeding with the next day's work. Waterstops shall be compatible with all material and shall not emit dangerous or incompatible fumes.

C. Arrange work sequence to avoid damage to newly constructed waterproofing. Any damage which occurs to the waterproofing membrane and/or system is to be brought to the attention of the Owner's Representative and/or design professional and membrane manufacturer. All damage is to be repaired according to the membrane manufacturer's recommendations. The party responsible for damage shall bear the cost of repairs.

D. Arrange work sequence to avoid use of newly-constructed waterproofing for storage, walking surface, and equipment movement. Where such access is absolutely required, the contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. Both HDPE and felt protection shall be provided for all waterproofing areas which receive traffic during construction.

E. Prior to and during application, all dirt, debris, and dust shall be removed from surfaces by vacuuming, sweeping, blowing with compressed air, and/or similar methods.

1.9 SEQUENCING OF THE WORK

A. Work in conjunction with the other trades for the timely performance of the work. Coordinate with other trades to avoid damage to waterproofing membrane.
   1. Completed sections of the waterproofing membrane shall be accepted by the Owner's Representative before proceeding with subsequent layers.
   2. Piping Wall Penetrations: Coordinate with the plumbing contractor the installation of piping seals and sealant systems.

1.10 WARRANTY

A. Waterproofing Warranty: Upon completion and acceptance of the work required by this section and sections referenced above, the waterproofing materials manufacturer will provide a written five (5) year HydroShield Warranty, covering both materials and labor, to the project owner.
   1. Manufacturer's warranty shall include thermoplastic sheet waterproofing with active polymer core and bentonite composite sheet waterproofing.
   2. Issuance of Manufacturer's HydroShield Warranty requires the following: (1) System waterproofing products shall have been provided by a single manufacturer; (2) Installation of waterproofing products and prefabricated drainage composite by Manufacturer's Approved Applicator; (3) Installation inspected by certified Independent Inspection Firm per Section 1.06E; (4) Waterstop must be installed in all applicable horizontal and vertical cold pour concrete construction joints and around applicable penetrations.
   3. Manufacturer's warranty shall be independent from any other warranties made by the Contractor under requirements of the Contract Documents and may run concurrent with the other warranties.

B. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace waterproofing system that does not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Installer's warranty shall include thermoplastic sheet waterproofing with active polymer core and bentonite composite sheet waterproofing.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC SHEET WATERPROOFING SYSTEM

A. Products: Subject to compliance with requirements, provide one of the following:

B. Thermoplastic Sheet with integrally bonded self-sealing backup waterproofing layer: 60-mil-(1.5-mm-) thick KEE membrane Elvaloy KEE based thermoplastic membrane reinforced with a 5.0 oz. weft inserted knit polyester fabric integrally bonded to an Active Polymer Core (APC).
   1. CoreFlex-60; CETCO.
   2. No known equal.

Physical Properties		
Property	Test Method	Typical Value
Hydrostatic Pressure Resistance	ASTM D5385	231 ft (70 m)
Puncture Resistance	ASTM D4833	228 lbf (1014 N)
Breaking Yield Strength	ASTM D751	318 lbf/in(62.2 N/mm)
Low Temperature Flexibility (-30°F)	ASTM D2136	Pass
Water Vapor Retarder	ASTM E1745	Class A
Water Vapor Transmission	ASTM E96	0.1 perms (0.036 gr/m/hr)
Tensile Strength	ASTM E154	387 lbf/in (68 kN/m)
Puncture Resistance	ASTM D1709	12 lbs (5500 grams)

2.2 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
   1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Concealed Sheet Flashing: Same material, construction, and thickness as sheet waterproofing.

C. Thermoplastic Flashing (Exposed): Thermoplastic-sheet flashing 60 mils thick reinforced UV stable thermoplastic membrane used for flashing applications exposed to direct UV, weathering conditions and where indicated.
   1. Product: Coreflash UV
   2. Adhesive: Adhesive SB-100

D. Surface Conditioner: Manufacturer's standard waterborne surface treatment to bind residual surface dust and efflorescence to substrate.

E. Bonding Adhesives: For bonding waterproofing sheets and t-sheet flashings to substrates.

F. Lap Adhesive: Manufacturer's multi-purpose, single component polyether moisture cure sealant/adhesive.

G. Geotextile Fabric: Manufacturer's standard 0.22-inch- (5.59-mm-) thick, nonwoven polypropylene fabric.

H. Waterproofing and Sheet-Flashing Accessories: Provide sealants, pourable sealers, termination reglets, clamps, compression bars, tapes, and other accessories recommended by waterproofing manufacturer for intended use.

I. Control Test Drain: Manufacturer's standard assembly to verify the absence or presence of leaks from underside of waterproofed slab.

J. Termination Bar: Minimum 1" wide by 1/8 inch thick aluminum termination bar with pre-punched holes for fastening at 6 inches on center with stainless steel powder actuated fasteners.

K. Fasteners: Stainless steel powder actuated fasteners.

L. Waterstops: Flexible strip concrete construction joint waterstop that provides a positive seal by expanding upon contact with water.
   1. Volclay Waterstop-RX 101; CETCO

M. Thermoplastic-Clad Flashing: 24 gauge stainless steel sheet laminated with 20 mil thick UV-stable thermoplastic coating integrally bonded to one side.
   1. Product: Coreclad

N. Cementitious Fill: Polymer modified cementitious non-sag mortar for sloping courses.
   1. Compressive Strength: 3,500 psi in 28 days; ASTM C109

O. Protection Metal: Stainless Steel, ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.

P. Hose Clamps: 100 percent 316 Stainless steel hose clamps.

Q. Subsurface Drainage Composite: Prefabricated sheet drain consisting of a 3-dimensional polypropylene formed dimple core covered with a non-woven polypropylene filter fabric bonded to one side.
   1. Product: Aquadrain 15X.

R. Base Drainage Composite: three dimensional drainage core with a geotextile adhered to both sides to allow water passage while restricting soil particles.
   1. Product: Aquadrain 100BD.

S. Pipe Penetration Sleeves: PVC sleeves with 3-inch rib
   1. Century-Line Sleeves manufactured by PSI-Thunderline/Link-Seal.
   2. No known equal.

T. EPDM rubber chain seal with stainless steel hardware to be used between a PVC pipe sleeve and a rigid pipe.
   1. Link-Seal EPDM modular seal assembly manufactured by PSI-Thunderline/Link-Seal.
   2. No known equal.

U. Concrete backer board.
   1. Durock Cement Board Next Gen manufactured by USG.
   2. Thickness: 1/2-inch

V. Protection Board - Vertical: Closed-cell extruded polystyrene insulation board.
   1. Thickness: 1-inch
   2. Thermal Resistance: Minimum 5.0 ft^2 x h x degrees F/Btu, R-value at 75 degrees F mean temperature; ASTM C518
   3. Compressive Strength: Minimum 25 psi; ASTM D1621
   4. Water Absorption: Maximum 0.1% by volume; ASTM C272
   5. Water Vapor Permeance: Maximum 1.1 perm; ASTM E96
   6. Coefficient of Linear Thermal Expansion: 3.5 x 10`; ASTM D696
   7. Flexural Strength: Minimum 50 psi; ASTM C203

W. Below Grade Polyurethane Sealant: Polyurethane based, caulk grade, single component swelling paste.
   1. Product: Akwaswell

X. Below Grade Sealant/Adhesive: Single component polyether moisture cure sealant/adhesive for temporary securement of protection layer and adhesive for waterstop.
   1. Product: Cetseal

Y. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

Z. Tieback Head Covers: Manufacturer's single piece preformed thermoplastic cover compatible with thermoplastic sheet waterproofing. Include thermoplastic membrane flange to weld thermoplastic sheet waterproofing.
   1. Fill for tieback head cover installation: 50/50 mixture of bentonite granules and bentonite mastic or 2-part urethane spray foam, minimum 20 PSI.

PART 3 - EXECUTION

3.1 GENERAL

A. Prevent bentonite waterproofing products from hydrating before material is contained within other waterproofing components.

B. Provide sufficient excess horizontal materials to accommodate the installation of protection and structural slabs and allow proper tie-in to the vertical systems.

C. Secure termination bars by fastening on one side and working towards the other side. Cut termination bars at corners. Termination bars shall be secured at 6 inches on center, unless more stringent requirements are indicated elsewhere.

3.2 SUBSTRATE INSPECTION AND CONDITIONS

A. The installer shall examine conditions of substrates and other conditions under which this section work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory substrate conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements.

B. Concrete: Concrete to be waterproofed shall be properly placed and consolidated. Reinforced structural slabs should be a minimum of 6" (150 mm) thick when placed over membrane. Cast-in-place concrete to receive waterproofing shall be of sound structural grade with a smooth finish, free of debris, oil, grease, laitance, dirt, dust, or other foreign matter which will impair the performance of the waterproofing and drainage system and which do not comply with manufacturer's warranty requirements. Sharp ridges, other projections and loose materials shall be removed to ensure a smooth surface before installing leveling layer.

C. Form fins, ridges, ponding ridges and other protrusions should be level and smooth with monolithic concrete surface.

D. Formwork: Remove all sharp projections from application side of forms. Do not permit nails to protrude through forms into application areas.

3.3 EXAMINATION

A. Examine all surfaces scheduled to receive waterproofing membrane and flashing for roughness, contaminants, unsound structural substrates, or other conditions that may impair the waterproofing application. Notify the Contractor and Owner's Representative and copy the membrane manufacturer in writing of any such conditions; do not commence work until defects are remedied.

B. Substrate surface shall be equivalent to a smooth float finish.

C. Confirm that all electrical, plumbing and other rough outs are completed and in place prior to installing waterproofing system.

3.4 WATERSTOP INSTALLATION

A. Install waterstop in strict accordance with manufacturer's recommendations and written instructions.

B. Install continuous waterstop a minimum of 3 inches away from exterior face of concrete.

C. Install waterstop in a continuous bead of below grade sealant/adhesive. Tightly butt ends in below grade sealant/adhesive to form a continuous waterstop.

D. Install one strip of waterstop in all horizontal and vertical shotcrete construction cold joints.

E. Install one strip of waterstop in all shotcrete lift joints after the joint surface has been cleaned of rebound, poorly bonded material, or any other defect. Secure by pushing waterstop halfway down into fresh shotcrete. 1-1/2” wide strip of flat surface shall be tooled or formed into the shotcrete surface at rough surfaces to facilitate proper installation of the waterstop.

F. Install one strip of waterstop around all mechanical penetrations extending through the shotcrete foundation.

G. Install one strip of waterstop around all steel reinforcement anchorage.

H. Waterstop shall not be prehydrated. Prehydrated waterstop shall be removed and replaced at no additional cost to the Owner.

3.5 TIEBACK HEAD COVER INSTALLATION

A. Tieback Head Covers: Fill voids in substrate and tieback head assembly with spray foam. Install tieback head cover prior to waterproofing membrane.
   1. Fill pre-formed shape of tieback head cover with 2-part urethane spray foam and place over tieback head before foam sets up.
   2. Secure tieback head cover to soil retention system using washer head fasteners along the outside edge of the flat base.
   3. Apply 1/4-inch thick by minimum 3-inch wide continuous ring of manufacturer’s recommended adhesive onto the flat base just outside of the 1/2-inch raised collar.
   4. Install 4-ft by 4-ft piece of waterproofing membrane, with precut hole in the center to fit tight around raised collar, over the entire flat base with outside edges fastened to the retaining wall.
   5. Secure membrane edge around raised collar with washer-head fasteners that pass through the adhesive ring. Space fasteners 6-inches on center. Do not install fasteners or puncture tieback head cover inside of the raised collar.
   6. Apply counterflashing of adhesive along waterproofing sheet edge around raised collar.
   7. Install waterproofing membrane field sheet overlapping weldable flange and fuse waterproofing membrane to weldable flange with continuous weld.
   8. Secure any loose backup geotextile with manufacturer’s polyether sealant.

3.6 SUBSURFACE DRAINAGE COMPOSITE

A. Install subsurface drainage composite and other subsequent topping as each section is completed.

B. Cementitious Board: Prior to installing subsurface drainage composite to finished grade elevation, install cementitious wall board centered over steel soldier pile from finished grade elevation to specified depth that the top of steel soldier pile and wood lagging will be removed. Cementitious wall board will protect waterproofing when top of soldier pile is excavated and removed. Remove cementitious wall board with removal of metal soldier pile head and lagging.

C. At the base of the lagging wall, install base drainage composite horizontally oriented with the open core edge up and the 2 inch fabric flap side away from the lagging wall. Secure the bottom edge of base drainage composite to the lagging wall with washer-head fasteners every few feet. Use couplers and corner fittings, as required, to form a continuous base drainage composite installation. Install discharge outlet fittings to connect with discharge pipes as required for the project.

D. Install the bottom course of subsurface drainage composite sheet drainage horizontally oriented with the subsurface drainage composite bottom edge fabric flap tucked behind the top edge of the base drainage composite against the lagging to prevent the passage of soil into the core at the connection. Bottom edge of subsurface drainage composite core should be in contact with open top core edge of base drainage composite. Place the 2 inch fabric flap of the base drainage composite over the back of the subsurface drainage composite core and secure it with seam tape. Secure the top edge of base drainage composite to the lagging wall with washer-head fasteners 24 inches on center.

E. Install subsequent rolls of subsurface drainage composite sheet drainage to within 12 inches of finished grade or as shown on the project drawings. Tightly abut adjoining sheet drain core edges and tuck the extra fabric flaps behind the adjacent roll edge to keep soil from entering the sheet drain. Secure sheet drain to lagging wall with washer-head fasteners.

3.7 THERMOPLASTIC SHEET INSTALLATION

A. General: Prepare surfaces and install loosely laid sheets over entire area to receive waterproofing according to manufacturer's written instructions.
   1. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the performance of the waterproofing system
   2. Do not permit asphaltic materials or polystyrene insulation to contact thermoplastic materials.
   3. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.
   4. Install laps shingled with slope of deck where possible.
   5. Install flashings concurrently with deck sheet.
   6. Perform hot-air welding to ensure a watertight seam installation. Inspect outside edge of seams with pointed metal probe and ensure completed laps lay flat and are free of voids, fishmouths, or wrinkles.
   7. Install sheets and auxiliary materials to tie into adjoining waterproofing.

3.8 WALL SHEET INSTALLATION

A. At base of wall, secure membrane horizontally oriented to the wall with thermoplastic membrane offset edge side up. Position the bottom thermoplastic edge extending out onto the horizontal substrate a minimum 12".

B. Approximately 1-1/2” down from the top edge, secure the thermoplastic membrane offset to the wall with washer-head mechanical fasteners spaced a maximum of 24” on center.

C. Install adjacent membrane sheets with the thermoplastic membrane and backup layers overlapped a minimum 4”.

D. Assemble and weld laps. Secure any loose or peeled backup layer material with continuous bead of sealant.

E. Do not allow horizontal membrane overlap joints to run at same elevation as the concrete pour lift joints; extend membrane past a minimum 12”. Install adjacent membrane sheets overlapped a minimum 4”. Assemble and weld laps. As applicable, secure any loose or peeled backup layer material.

F. Install membrane horizontally oriented on the wall to position the top thermoplastic membrane edge a minimum 18" (450 mm) above of the top slab elevation. For thick slabs this minimum 18" requirement can be met by installing additional membrane courses oriented horizontally. Overlap all adjacent membrane edges a minimum 4"; assemble and weld laps pin accordance with requirements within this Section; secure any loose or peeled backup layer material with continuous bead of sealant.

G. Weld 4" flashing membrane reinforcement piece centered over the welded membrane overlap directly at the point where the membrane transitions from the horizontal to the wall.

H. Wall Penetrations: For all pipe, rebar, structural and other penetrations install waterproofing system per manufacturer's standard details.

I. Inside and Outside Corners: Install manufacturer's standard inside and outside corners per standard details.

3.9 MEMBRANE TERMINATION AT TOP OF WALL

A. Start termination course with top edge of membrane 12 inches below finished grade with membrane horizontally oriented. Install termination bar fastened 6 inches on center along the top edge of the membrane.

B. Install thermoplastic flashing membrane with UV-resistant (white) side facing exterior and bottom edge overlapping waterproofing membrane a minimum 4 inches; adhere flashing membrane continuously to substrate (except for top 2 inches. Secure flashing membrane to waterproofing membrane with a continuous thermoplastic weld per manufacturer's guidelines. Overlap adjacent flashing membrane rolls a minimum 4 inches and seal with continuous thermoplastic weld.

C. Terminate top edge of flashing membrane as follows: Apply manufacturer's recommended below grade sealant/adhesive 2 inch x 90 mil thick behind the top edge of flashing membrane. Secure top edge of flashing membrane with a termination bar fastened into substrate 8 inches on center. Then apply a continuous bead of below grade sealant/adhesive over termination bar and to seal top edge of the termination bar to substrate. Counter flash or cover the termination.

D. Inspect finished termination and repair any damaged material.

3.10 UNDER SLAB INSTALLATION

A. Reinforced structural foundation slabs shall be a minimum of 6" thick where thermoplastic sheet waterproofing is installed. Install thermoplastic sheet waterproofing under all footings, elevator pits and grade beams when hydrostatic conditions exists or are anticipated per the historical high ground water elevation reported in the project's geotechnical documents.

B. Place thermoplastic sheet waterproofing directly on properly prepared mud slab substrate (APC geotextile side facing up; yellow side down) with adjoining thermoplastic membrane edges overlapped a minimum of 4 inches. Assemble and weld laps; secure any loose or peeled APC layer material with continuous bead of Cetseal. When the slab is poured in sections, extend thermoplastic sheet waterproofing a minimum 12 inches beyond the slab section edge to enable proper membrane overlapping. At the slab perimeter overlap the corner transition sheet installed a minimum 4 inches; assemble and weld laps.

C. Slab Penetrations: For all pipe, rebar, structural or other penetrations install waterproofing system per manufacturer's standard detail for specific project condition(s).

D. Grade Beams: Install thermoplastic sheet waterproofing under the entire grade beam by lining the form work prior to placing the reinforcing steel. Line the grade beam formwork with thermoplastic sheet waterproofing prior to placement of reinforcing steel. Leave a minimum 12 inches of thermoplastic sheet waterproofing at the top of the form to tie into under slab waterproofing. Overlap adjacent membrane edges a minimum 4 inches; assemble and weld laps.

E. Inside and Outside Corners: Install thermoplastic sheet waterproofing membrane per manufacturer's standard detail with applicable universal corner piece welded.

F. Inspect finished thermoplastic sheet waterproofing installation and repair any damaged material prior to concrete slab placement.

G. Waterstop shall be installed in all slab joints, around applicable slab penetrations and structural members. Refer to Waterstop Product Manual for further installation procedures and guidelines.

3.11 OVERLAP ASSEMBLY PROCEDURES

A. Assemble waterproofing membrane overlaps with both the thermoplastic membrane and the backup layers overlapping a minimum 4" (100 mm) with all thermoplastic membrane edges continuously welded per manufacturer's guidelines. Membrane overlaps shall be oriented to shed water (shingle style) whenever possible. Specific equipment, especially wedge welders, may require greater overlap dimensions to facilitate welding.

B. Along the long roll edges, backup layer shall be offset 6" (150 mm) from the thermoplastic membrane to facilitate thermoplastic welding. To facilitate thermoplastic welding along roll end edges or field cut roll dimensions, peel the backup layer back away from the thermoplastic membrane edge as required to accommodate various welding equipment and field conditions. Do not cut off the peeled backup geotextile layer. After peeling, fold back and temporarily secure the peeled backup layer with duct tape or other similar non-penetrating method to suspend it out of the way for the overlap thermoplastic welding process. The adjacent membrane backup layer edge does typically not need to be peeled.

C. Overlap the adjacent membrane edges, thermoplastic to thermoplastic, and maintain a uniform minimum overlap width of 4" (100 mm).

D. Following the overlap thermoplastic welding process, fold back any peeled backup layer material to its approximate original position, whereas it overlaps the adjacent membrane backup layer a minimum 4" (100 mm), and secure it with manufacturer's standard sealant.

3.12 MEMBRANE WELDING PROCEDURES

A. Welding equipment shall be approved by manufacturer.

B. All welding shall be performed only by qualified personnel trained by manufacturer's representative prior to field welding.

C. Use of automated welding equipment is recommended for all membrane overlap seams exceeding 10 feet (3 m) in length. Automated equipment can either be hot air welding machine or a wedge welding machine. All welds shall be continuous and without interruption or defect.

D. Prior to welding, start welding equipment and allow it to warm up to optimum welding temperature. Equipment warming period may vary depending on weather conditions and will need to be verified each day and after equipment has been cooled down and restarted and must be confirmed with a test weld.

E. Hot Air Welders: For all field seams use a 1-1/2" (40 mm) wide nozzle to create a nominal 1-1/2" (40 mm) wide homogeneous thermoplastic weld. Use a minimum 3/4 " (20 mm) wide nozzle for corners, T-joints, patches and other field detailing, maintaining a nominal 3/4" (20 mm) wide homogeneous thermoplastic weld. All welds shall be continuous and without interruption or defect.

F. All seams must be clean and dry prior to initiating any field welding procedures. Remove all foreign materials from the seams (dirt, oils, etc.) using clean white cotton cloth. Do not use denim or synthetic, synthetic blend or paper rags for cleaning.

G. Contamination occurring within a seam shall be patched to ensure water-tight integrity of the weld.

H. Follow equipment manufacturer's instructions and observe local codes and site requirements for electricity supply, grounding, GFI and other current protection. Dedicated circuit, house power or a dedicated portable generator is required. No other equipment (including but not limited to hand welders) shall be operated off the dedicated power source.

I. T-Joints (multiple thermoplastic membrane overlaps). A 4" (100 mm) plate or piece of manufacturer's recommended membrane for patching at T-Joint is required centered and hot air welded at the T-Joint intersection using the following steps.
   1. All membrane edges forming the T-Joint that will be covered by the plate plus 1" (25 mm) beyond, must be feathered to provide a smooth transition for the plate. The feathering can be accomplished with a hot nozzle of hand welding tool.
   2. While hand welding the plate, use the edge of the hand roller to conform the plate completely to the thermoplastic membrane overlaps to prevent voids at the feathered membrane edges.

J. Hand Welding seams shall be competed per the following steps:
   1. Step One: Intermittently tack weld the overlap to hold the thermoplastic membrane overlap in place and maintain a uniform minimum overlap width of 4" (100 mm).
   2. Step Two: Insert the nozzle into the back of the overlap. With a silicone roller pinch off the back edge to trap the hot air and make a thin pre-weld. The pre-weld will serve to concentrate heat along the exterior edge of the overlap during step three.
   3. Step Three: Insert the nozzle of the hand welder into the lap at a 45° angle relative to the sheet edge. As the thermoplastic membrane surface begins to flow, apply light pressure with a hand roller oriented at a right angle to the tip of the hand welder. As rolled, a small bead of molten material should bleed out of the seam edge.

K. Automated Hot-Air Welders:
   1. Use a 1-1/2" (40 mm) wide nozzle to create a nominal 1-1/2" (40 mm) wide homogeneous thermoplastic weld. Depending on the location of the bearing weight and design of the equipment, a sheet metal track may be required. Welds shall be continuous and without interruption or defect.
   2. Including but not limited to underslab installations, move the peeled backup geotextile layer out of the way (do not cut it off) in order for welding equipment to run unobstructed and uninterrupted. Weld the thermoplastic membrane overlap. Following the welding process, fold back the peeled backup geotextile layer to complete the 4" (100 mm) overlap assembly.

L. Wedge Welders:
   1. Use a minimum 2" (50 mm) wide wedge to create a nominal 2" (50 mm) wide homogeneous thermoplastic weld without interruption or defect.
   2. Membrane overlap assembly may need to be increased according to the requirements of the equipment.
   3. Prior to wedge welding, fold the backup geotextile layer selvege edge of the bottom sheet back under and out of the way in order for the thermoplastic membrane of the bottom sheet to make contact with the wedge. Fold back the backup layer selvege edge for the entire length to be welded.
   4. After completing thermoplastic weld, lift up membrane and unfold the backup geotextile layer selvege edge to provide minimum 4" (100 mm) backup layer to backup layer overlap at the membrane overlap assembly.

M. Quality control/inspection of welded seams:
   1. All welds shall be inspected by the waterproofing applicator's job foreman and/or supervisor daily after cooling. Weld continuity inspection shall include, but not be limited to, the probing of all field welds with a rounded screwdriver or other dull pointed instrument. Immediately mark and remediate any deficiencies.
   2. Each days welding should begin with an evaluation of welded seams conducted on a test strip of membrane. Adjust equipment speed and or heat/power settings as necessary to achieve proper welds. From the test weld, cut out and retain a 2" – 4" (50 mm – 100 mm) wide seam sample, date it and retain at the site for the independent inspector/owners rep. Further testing may be required as conditions change during the day, as problems arise or at the Owner's Representative's discretion. Each test cut shall be filled and patched per manufacturer's instructions, extending 4" (100 mm) beyond the edges of the cut opening and completed with a homogeneous thermoplastic weld. Each test cut shall be patched by the waterproofing applicator at no additional cost to the owner.

3.13 PROTECTION BOARD INSTALLATION

A. Install protection board over sheet waterproofing according to manufacturer's written instructions and before beginning subsequent construction operations. Minimize exposure of membrane.

B. Install protection board over completed waterproofing membrane installation as soon as possible.

3.14 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 14 13

HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Surface preparation
   2. Hot rubberized-asphalt (HRA) waterproofing, reinforced
   3. Flashings and terminations
   4. Embedded electronic leak detection system for waterproofing system
      a. At Level 7, ELD wiring must be left permanently accessible, but enclosed in an Owner-approved enclosure, for future electronic leak detection testing. Comply with the ELD testing agency's requirements. Topping slab shall not have metal reinforcing.
   5. Pre-Acceptance testing for installed waterproofing system
   6. Expansion joint
   7. Protection course
   8. Drain mat

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

B. Canadian Government Specification Board CGSB-37.50-M89, Standard for "Asphalt, Rubberized, Hot Applied, for Roofing and Waterproofing."

1.3 SYSTEM DESCRIPTION

A. Furnish and install a completed waterproofing assembly including surface conditioner, a monolithic, reinforced rubberized asphalt membrane, protection course, flashings, protection layer and drainage course. To ensure total system compatibility all products must be purchased from a single-source manufacturer.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions. Also include electronic leak detection system install, mapping, and testing process.

C. Certification from an approved independent testing laboratory experienced in testing this type material, that the material meets the CGSB-37.50-M89 standard for rubberized asphalt membranes, including applicable ASTM procedures.

D. Certification showing full time quality control of production facilities and that each batch of material is tested to ensure conformance with the manufacturer's published physical properties.

E. Certification showing that all waterproofing components are being supplied and warranted by a single-source manufacturer.

F. Certification showing that installer is certified as a current Approved Applicator with manufacturer for the specified warranty.

G. The plant manufacturing this type material must have ISO 9002 approval as evidenced by a notarized copy of the official certificate.

1.5 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Field-Adhesion Test Reports: For each test on the Project.

C. Sample warranties.

1.6 QUALITY ASSURANCE

A. The Waterproofing Contractor shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:
   1. Certification or license by the membrane manufacturer as a locally based, authorized applicator of the product the installer intends to use, for a minimum of five (5) years.
   2. List of at least three (3) projects, satisfactorily completed within the past five (5) years, of similar scope and complexity to this project. Previous experience submittal shall correspond to specific membrane system proposed for use by applicator.

B. The rubberized asphalt membrane product shall contain an inert clay filler to enable the product to be resistant to acids (fertilizers, building washes and acid rain).

C. Membrane Manufacturer Qualification: Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:
   1. Membrane Manufacturer must show evidence that the specified rubberized asphalt has been manufactured by the same source for fifteen (15) years and successfully installed on a yearly basis for a minimum of fifteen (15) years on projects of similar scope and complexity.
   2. Membrane Manufacturer shall have available an in-house technical staff to assist the contractor, when necessary, in application of the products and final inspection of the assembly.

D. Owner shall make arrangements and payments for an independent inspection service to monitor installation compliance with the project documents and manufacturer’s published literature, installation instructions, and site specific details. Independent construction observation firm shall be a company certified by manufacturer in writing as a current Certified Observer/Inspector.

E. Owner shall make arrangements and payments for a permanent, left in place electronic leak detection system to be installed directly over the completed waterproofing system. Electronic leak detection firm shall produce reports and digital photographs documenting the inspection and procedure. Reports shall be made available in a timely manner to the Installer, General Contractor, Manufacturer, Architect and Owner. Electronic leak detection firm shall be approved by manufacturer in writing.

F. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field installation to establish procedures to maintain required working conditions and to coordinate this Work with related and adjacent Work. Verify that final waterproofing and waterstop details comply with waterproofing manufacturer's current installation requirements and recommendations. Pre-con meeting attendees should include representatives for the Owner, Architect, inspection firm, Contractor, waterproofing contractor, concrete contractor, excavating/backfill contractor, and mechanical and electrical contractors if Work penetrates the waterproofing.

G. Sole Source: All products shall be purchased from a single-source manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery, storage and handling of materials shall be in accordance with manufacturer’s published instructions.

B. Deliver materials in original unopened containers of packaging clearly labeled with manufacturer's name, brand name, instruction for use and all identifying numbers.

C. Materials shall be stored in a neat, safe manner, not to exceed the allowable structural capacity of the storage area.

D. Store materials in a clean, dry area protected from water and direct sunlight.

E. Store all adhesives at temperatures between 60°F (15.5°C) and 80°F (26.6°C). If exposed to lower temperatures, restore materials to 60°F (15.5°C) minimum temperature before using.

F. Store rolls on end, original pallets or elevated platform, unless otherwise instructed by manufacturer.

G. Do not allow expansion joint fleece material to get wet.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, or when temperature is below 40 degrees F.

B. Preparation and application of membrane must be conducted in well ventilated areas.

C. Do not expose membrane or accessories to a constant temperature in excess of that permitted or recommended by the manufacturer.

D. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the waterproofing membrane. Any exposure to foreign materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine any impact on the waterproof membrane assembly performance.

1.9 WARRANTY

A. Special Warranty: Custom warranty with no monetary limitation on Manufacturer's standard form in which manufacturer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within specified warranty period.
   1. Warranty Period: 15 years from date of Substantial Completion.

B. Contractor’s Labor and Material Guarantee: Correct defective Work at no cost to the Owner.
   1. Warranty Period: Five (5) years from the date of Final Completion.

PART 2 - PRODUCTS

2.1 HOT RUBBERIZED ASPHALT (HRA) WATERPROOFING

A. HRA Waterproofing: Single component; 100 percent solids; hot fluid-applied, rubberized asphalt waterproofing membrane.
   1. Basis of Design Product: Subject to compliance with requirements, provide Strataseal HR by Cetco Building Materials.
   2. Acceptable Manufacturers: Subject to compliance with requirements, Monolithic Membrane 6125 by American Hydrotech, Inc. is an approved equal.
   3. Mil Thickness: 215 mils.

2.2 FLASHING SHEET MATERIALS

A. Neoprene Reinforcing: 60-mil minimum, uncured sheet neoprene:
   1. Cetco Building Materials; N-Flash
   2. American Hydrotech, Inc.; Flex Flash UN

B. Reinforcing Fabric: Fabric reinforcing sheet for horizontal applications:
   1. Cetco Building Materials; Stratabond 100 spunbonded polyester
   2. American Hydrotech, Inc.; Flex Flash F spunbonded polyester

C. Reinforcing Fabric: Fabric reinforcing sheet for vertical applications only:
   1. Cetco Building Materials; Stratabond 100 spunbonded polyester
   2. American Hydrotech, Inc.; Flex Flash FV woven fiberglass

2.3 AUXILIARY MATERIALS

A. Primer: Manufacturer’s primer or surface conditioner to prepare substrate for adhesion of waterproofing.
   1. Cetco Building Materials; Strataprime SB
   2. Concrete: American Hydrotech, Inc.; Surface Conditioner

B. Protection Course: Manufacturer's standard, 90-mil thick, rubberized asphalt protection sheet with synthetic fiber reinforcement.
   1. Cetco Building Materials; RAP 200
   2. American Hydrotech, Inc.; Hydroflex 30

C. Weep Protector: Allowing for drainage through weep holes in clamping ring.
   1. Nobleseal Positive Weep Protector; Noble Company.

2.4 EXPANSION JOINT SYSTEM

A. Expansion Joint System: Flat vulcanized waterproofing joint integral with the waterproofing system sized to accommodate movement indicated in the Contract Documents:
   1. Up to 2” movement: Situra; Redline 40
   2. Up to 4” movement: Situra: Redline 100
   3. Up to 10” movement: Situra; Redline 240
   4. Corners, T’s, L’s, and other transitions shall be prefabricated by the manufacturer.

2.5 DRAIN MAT

A. Drain Mat: Manufactured composite subsurface drainage panels consisting of a three-dimensional, crush-proof drainage core and a non-woven, needle punched filter fabric on each face, with a horizontal flow rate not less than 7 gpm/ft.
   1. Cetco Building Materials; Aquadrain G20
   2. American Hyrotech, Inc.; Hydrodrain 1000

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all surfaces to receive the waterproofing assembly to verify it is acceptable and proper for the application of the membrane.

B. Do not proceed with the installation of the waterproofing membrane assembly until all surface defects have been corrected.

C. Construction coat shall have cured minimum 21 days prior to application of hot fluid-applied rubberized asphalt waterproofing.

3.2 PREPARATION

A. Concrete decks must be monolithic, smooth, and free of voids, spalled areas, laitance, honeycombs, and protrusions. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids. Clean and prepare existing concrete surfaces using wire brush and other mechanical means.

B. Plywood decks must be inspected for signs of mold or mildew. Remove and replace boards that have mold or mildew. Remove and replace boards that have delamination or have warping or curling.

C. Clean and prepare substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.

D. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

E. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

F. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

G. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

H. Clean existing concrete surfaces using wire brush and other mechanical means.

3.3 PRIMER

A. Apply primer using a hand held sprayer evenly. Primer should "tan" the surface, not blacken it.

B. Allow sufficient time for the primer to thoroughly dry prior to the membrane application. Install membrane same day as primer

3.4 MEMBRANE PREPARATION

A. The membrane shall be heated in double jacketed, oil bath or air jacketed melter approved by the manufacturer with mechanical agitation, specifically designed for the preparation of a rubberized asphalt membrane.

B. Heat membrane until membrane can be drawn-free flowing at a temperature range between 320 degrees F and 340 degrees F. Do not exceed temperature of 375 degrees F. Membrane heated outside of manufacturer’s published temperature range shall be removed and replaced at no cost to Owner.

3.5 FLASHING INSTALLATION

A. Provide detailing and flashing at terminations of waterproofing membrane according to manufacturer's written instructions.

B. All detailing and flashing shall be completed before installing the membrane over the field of the substrate.

3.6 MEMBRANE INSTALLATION AT JOINTS

A. Provide joint treatment over non-moving cracks and joints. Where construction coat is applied, apply joint treatment over construction coat at joints.

B. At a width of 9-inches, apply the rubberized asphalt membrane at a rate to provide a continuous, monolithic coat of 90 mil minimum, into which is fully embedded a layer of 6 inch reinforcing fabric prior to installation of field membrane. Overlap reinforcing strip ends a minimum 2 inches, ensuring lap receives rubberized asphalt. Provide neoprene reinforcing in lieu of reinforcing fabric for cracks in concrete greater than 3/16 inch and up to 1/2 inch.

3.7 MEMBRANE APPLICATION

A. Apply the rubberized asphalt membrane at a rate to provide a continuous, monolithic coat of 90 mil minimum, into which is fully embedded a layer of the reinforcing fabric, followed by another continuous monolithic coat of membrane at an average thickness of 125 mil. Overlap reinforcing fabric 1-2 inches, ensuring lap receives rubberized asphalt. Total membrane thickness is to be 215 mils minimum.

B. Heat and apply rubberized asphalt according to manufacturer's written instructions.

C. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated and required by manufacturer.

3.8 PROTECTION COURSE

A. Embed the protection sheet into the membrane while it is still hot to ensure a good bond.

B. Overlap adjoining sheet edges (dry) a minimum of 3 inches to ensure complete coverage. Seal with hot applied rubberized asphalt in the seams and laps.

C. The completed membrane/protection assembly must be covered with subsequent topping materials as soon as possible, within 30 days of membrane installation.

3.9 EXPANSION JOINT INSTALLATION

A. Prepare substrates and install expansion joints in accordance with manufacturer’s recommendations and written instructions.

B. Ensure that folds in neoprene are free to move and not bonded. Use bond breaker tape between folds to prevent adhesion of adjacent folds.

C. Apply the first coat of hot fluid-applied rubberized asphalt waterproofing at the manufacturer's minimum required thickness.

D. Immediately embed the expansion joint material, making sure the bottom polyester fleece is in full contact with the hot asphalt.

E. Press the expansion joint material into the hot asphalt.

F. Lay the expansion joint in lengths that allow for immediate contact with the hot asphalt. Laying expansion joint in cold asphalt is prohibited.

G. Spread an even coat of hot fluid-applied rubberized asphalt waterproofing on the top surface of the expansion joint, ensuring the top polyester fleece is completely covered.

H. Embed fabric reinforcing overlapping the edge of the expansion joint by 3 inches, and ensuring full contact.

I. Apply a second coat of hot fluid-applied rubberized asphalt waterproofing on the top of the reinforcing fabric mesh at the manufacturer's minimum required thickness.

3.10 WATERPROOFING SYSTEM ACCEPTANCE TESTING

A. At Level 7, ELD wiring must be left permanently accessible, but enclosed in an Owner-approved enclosure, for future electronic leak detection testing. Comply with the ELD testing agency's requirements.

B. Electronic Leak Detection (ELD) Testing: After installation and activation of the ELD system, confirm that the field membrane has no detectable failures.
   1. Repair all observed membrane failures and repeat ELD detection and repairs until there are no detected anomalies.

C. Flood Testing: Commence flood testing of the membrane after EDL testing and membrane repairs are complete.
   1. The entire deck shall be flood tested for leaks in accordance with ASTM D-5957.
   2. The minimum depth of the flood test shall be 2-inches.
   3. Contractor to verify that the structure can withstand the weight of the water test prior to commencement of the water test.
   4. The minimum duration for each flood test shall be 48 hours.
   5. Create temporary dams as required to confine and segment flood testing areas.
   6. All flood testing shall be performed in and documented in the presence of the Owner's independent observer.
   7. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
   8. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is deemed watertight by the Owner.
   9. Owner will engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.
   10. Install secondary protection layer immediately after successful completion of the testing protocol.
   11. Repeat ELD and Flood testing if there is a delay of more than 5 working days between completion of testing and installation of secondary protection layer.

D. Water test neoprene gutters to ensure they do not leak at seams and at connections between gutter and attachment for drain tubes.

E. If leaks should occur, the water must be drained completely and the membrane installation repaired. Retest until a passing water test without leaks is achieved.

3.11 DRAIN MAT INSTALLATION

A. Install drain mat on horizontal and vertical surfaces in accordance with the manufacturer's published instructions and recommendations. Use methods that do not penetrate waterproofing.

B. Layout and position drainage course and lay flat. Cut and fit drainage course to perimeter and penetrations.

C. Bond all geotextile overlap edges to adjacent drainage course geotextile with an acceptable adhesive to ensure geotextile integrity.

D. Protect installed molded-sheet drainage panels during subsequent construction.

E. Place subsequent topping materials as soon as possible.

3.12 FIELD QUALITY CONTROL

A. Contractor and a representative of the membrane manufacturer shall inspect the waterproofing assembly and notify the Waterproofing Consultant of any defects. All defects must be corrected at no additional cost.

B. Field-Adhesion Testing: Field pull test hot fluid-applied rubberized asphalt waterproofing adhesion to substrates as follows:

1. Extent of Testing: Test completed and cured hot fluid-applied rubberized asphalt waterproofing as follows:
   a. Perform tests one day prior to installation.
   b. Perform 2 tests for each location and each substrate.
   c. Perform 2 tests for each concrete pour.
   d. Perform tests where and as required by the Engineer.
   e. Retest if there are weather variations that affect installation of waterproofing.
2. Test Method:
   a. Prepare substrates as intended for project-specific waterproofing installation at each test location. Install primer on substrates indicated to receive primer. Allow primer to cure. Perform one pull test after primer has cured. Perform another pull test 24 hours after initial pull test.
   b. Apply rubberized asphalt membrane at a rate to provide a continuous, monolithic coat of 90 mils minimum. Embed half of 4 inch x 12 inch fabric reinforcement in hot rubber so 4 inches x 6 inches of fabric reinforcement is not embedded in hot rubber. Apply another continuous monolithic coat of membrane at a minimum thickness of 125 mils. Total membrane thickness is to be 215 mils. Allow rubberized asphalt to cool to the touch
   c. Pull fabric reinforcement 90 degrees from plane of installed hot rubber. Pull slowly, trying not to tear fabric reinforcement.
3. Inspect tested waterproofing and report on the following:
   a. Temperature, humidity and other weather conditions that affect installation of the waterproofing
   b. Whether waterproofing dimensions and configurations comply with specified requirements.
   c. Whether waterproofing connected to pulled-out portion failed to adhere to substrates or tore cohesively. Compare these results to determine if adhesion passes manufacturer's field-adhesion hand-pull test criteria.
4. Record test results in a field-adhesion-test log. Include dates when waterproofing was installed, names of persons who installed waterproofing, test dates, test locations, whether substrate was primed, adhesion results and installation dimensions.
5. Remove waterproofing and reinforcing from substrate following pull tests. Ensure that original waterproofing surfaces are clean and that new waterproofing contacts original waterproofing.
6. Coordinate pull tests with Engineer and Owner. Notify Engineer and Owner 48 hours in advance of pull tests.

C. Evaluation of Field-Adhesion Test Results: Waterproofing that fails cohesively within itself, not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove waterproofing that fails to adhere to substrates during testing or to comply with other requirements. Retest failed applications until test results prove waterproofing complies with indicated requirements.

3.13 CLEANING AND PROTECTION

A. Protect waterproofing from damage and wear from vehicular and pedestrian traffic during and after installation until placement of overburden.
   1. Repair damaged or deteriorated waterproofing immediately prior to application of overburden.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 17 16

BENTONITE COMPOSITE SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this section includes, but is not limited to, the furnishing and installing of bentonite geotextile composite waterproofing with trowel-grade bentonite at all seams, penetrations and terminations and with all applicable accessory products at all below-grade foundation walls with the exception of the kitchen and at all below-grade pit walls and under-slab.

B. Provide thermoplastic sheet waterproofing with active polymer core at kitchen below-grade walls. Refer to Section 07 13 55 “Thermoplastic Sheet Waterproofing with Active Polymer Core.”

C. Prior to ordering materials, contractor shall submit water samples to manufacturer for review, allow time for manufacturer review of samples, and distribute water sample test results to Owner and Consultant.

1. If, based on water samples, manufacturer submits in writing that contaminate resistance is not required for waterproofing, provide Voltex DS in lieu of Voltex DSCR and provide credit to the Owner for change in material.

1.2 RELATED REQUIREMENTS

A. Section 07 13 55 “Thermoplastic Sheet Waterproofing with Active Polymer Core” for below-grade waterproofing at kitchen below-grade foundation walls.

1.3 SYSTEM DESCRIPTION

A. Provide bentonite waterproofing system to prevent the passage of liquid water and install without defects, damage or failure. Waterproofing shall be two high strength geotextiles interlocked encapsulating minimum 1.10 lbs. per square foot (5.37 kg/sqm) granular sodium bentonite with an integrated polyethylene liner. Provide drainage composite at drained walls. Provide protection layer (not drainage composite) at walls to be backfilled that are not drained.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data, with complete general and specific installation instructions, recommendations, and limitations, for each product indicated.

B. Product Samples: Submit representative samples of the following for approval:

1. Bentonite geotextile composite waterproofing.

C. Material Certificates: Submit certificate(s) signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements. Submit certification that waterproofing system and components, drainage and protection materials are supplied by a single-source manufacturer.

D. Contractor Certificate: At time of bid, submit written certification that installer has current Approved Applicator status with waterproofing material manufacturer.

E. Sample Warranty: Submit project specific sample warranty by manufacturer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installing company shall have at least three (3) years experience in work of the type required by this Section, who can comply with manufacturer's warranty requirements, and who is an Approved Applicator as determined by waterproofing/drainage system manufacturer prior to bidding.

B. Manufacturer Qualifications: Bentonite geotextile composite waterproofing and all accessory products shall be provided by a single manufacturer. Manufacturer shall be capable of providing field service representation during construction, approving an acceptable installer, recommending appropriate installation methods, and conducting a final inspection of the bentonite waterproofing and prefabricated drainage system applied.

C. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field installation to establish procedures to maintain required working conditions and to coordinate this Work with related and adjacent Work. Verify that final waterproofing and waterstop details comply with waterproofing manufacturer's current installation requirements and recommendations. Pre-con meeting attendees should include representatives for the Owner, Architect, inspection firm, Contractor, waterproofing contractor, concrete contractor, excavating/backfill contractor, and mechanical and electrical contractors if Work penetrates the waterproofing.

D. Materials: Obtain bentonite geotextile composite waterproofing with integrated polyethylene liner and prefabricated drainage materials from a single manufacturer to assure material compatibility.

E. Independent Inspection: Owner shall make all arrangements and payments for an independent inspection service to monitor waterproofing material installation compliance with the project contract documents and manufacturer’s published literature and site specific details. Independent Inspection Firm shall be an approved company participating with the waterproofing manufacturer’s Certified Inspection Program. Inspection service shall produce reports and digital photographs documenting each inspection. Reports shall be made available to the Contractor, waterproofing installer, waterproofing material manufacturer, and Architect. Inspections should include substrate examination, beginning of waterproofing installation, periodic intervals, and final inspection prior to concrete or backfill placement against the waterproofing.

F. Water Sample Test: Project site water sample supplied to manufacturer by waterproofing contractor to verify type of bentonite system (standard sodium bentonite or contaminate resistant (CR) sodium bentonite) to be utilized on the project.

1. Manufacturer shall conduct test free of charge. Contractor is responsible for collection and shipment of one liter of actual site water. Water should be shipped in uncontaminated, sealed plastic container to: CETCO Technical Center, Attn: BMG Water sample Technician, 2870 Forbs Avenue, Hoffman Estates, IL 60192. Also provide project name, city and state along with return address to forward test results.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling: Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from construction operation related damage and prolonged weather exposure. Remove damaged material from site and dispose of in accordance with applicable regulations.

B. Storage: Do not double-stack pallets during shipping or storage. During storage protect waterproofing materials from moisture, excessive temperatures and sources of ignition. Provide cover, top and all sides, for materials stored on-site, allowing for adequate ventilation.

1.7 PROJECT CONDITIONS

A. Substrate Condition: Proceed with work only when substrate construction and preparation work is complete and in condition to receive waterproofing system.

B. Weather Conditions: Perform work only when existing and forecasted weather conditions are within the guidelines established by the manufacturer of the waterproofing materials. Do not apply waterproofing materials into standing water or over ice and snow. Though exposure to precipitation and ground water seepage typically will not adversely affect bentonite geotextile composite waterproofing, the General Contractor shall maintain site conditions to remove standing water from precipitation or ground water seepage in a timely manner. Should bentonite geotextile composite waterproofing be subjected to pre-hydration as a result of prolonged immersion, inspection of the material and written acceptance from the manufacturer is required prior to concrete or backfill placement.

1.8 WARRANTY

A. Waterproofing Warranty: Upon completion and acceptance of the work required by this section, the waterproofing materials manufacturer will provide a written five (5) year HyrdroShield warranty, covering both materials and labor, to the project owner.
   1. Issuance of Manufacturer's HydroShield Warranty requires the following: (1) System waterproofing products shall have been provided by a single manufacturer; (2) Installation of waterproofing products and prefabricated drainage composite by Manufacturer's Approved Applicator; (3) Installation inspected by certified Independent Inspection Firm per Section 1.06E; (4) Volclay Waterstop-RX must be installed in all applicable horizontal and vertical cold pour concrete construction joints and around applicable penetrations.
   2. Manufacturer's warranty shall be independent from any other warranties made by the Contractor under requirements of the Contract Documents and may run concurrent with the other warranties.

B. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace waterproofing system that does not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sodium Bentonite: Specially selected Wyoming granular sodium bentonite with 90% passing through a 20-mesh sieve and less than 10% passing through a 200-mesh sieve. Sodium bentonite shall have a 2 gram free swell minimum volume of 16 cc and a maximum fluid loss of 18ml in de-ionized water.

2.2 BENTONITE GEOTEXTILE COMPOSITE

A. Bentonite Geotextile Composite: 4' x 14.5' (1.2 x 4.4m) roll of interlocked geotextiles encapsulating a minimum of 1.10 lbs. per square foot (5.37 kg/sqm) of granular sodium bentonite. Composite shall consist of one woven and one non-woven polypropylene geotextile, interlocked using a needle-punching process that produces several interlocks per square inch (6.45 sq. cm) over the entire surface area of product with an integrated polyethylene liner on one side.
   1. Product: Volclay Voltex DSCR (contaminate resistant); CETCO

B. Bentonite Geotextile Composite Waterproofing Properties:

PROPERTY	TEST METHOD	TYPICAL VALUE
Peel Adhesion to Concrete	ASTM D 903 mod.	15 lbs. /in. (2.6 kN/m) min.
Hydrostatic Pressure Resistance	ASTM D 5385 mod.	231 ft. (70 m)
Permeability	ASTM D 5084	1×10^{-10} cm/sec.
Grab Tensile Strength	ASTM D 4632	95 lbs. (422 N)
Puncture Resistance	ASTM D 4833	140 lbs. (620 N) min.
Low Temperature Flexibility	ASTM D 1970	Unaffected at -25°F (-32°C)
Geotextile Interlock Peel	ASTM D 4632	15 lbs. (65 N)
Water Vapor Transmission Rate	ASTM E 96 (B)	0.03 grains/hr/ft^2

2.3 ACCESSORY WATERPROOFING PRODUCTS

A. All accessory waterproofing materials shall be provided by the bentonite waterproofing manufacturer or shall have manufacturer's written approval for substitution.

B. Trowel Grade Bentonite: Trowel grade sodium bentonite compound used as detailing mastic around penetrations, corner transitions and grade terminations.
   1. Product: Volclay Bentoseal

C. Seam Tape: 2" (50 mm) wide butyl rubber sealant tape.
   1. Product: Volclay SeamTape

D. Termination Bar: Minimum 1" wide by 1/8 inch thick aluminum termination bar with pre-punched holes for fastening at 6 inches on center with stainless steel powder actuated fasteners.

E. Fasteners: Stainless steel powder actuated fasteners.

F. Waterstop: Waterstop-RX 101

G. Subsurface Drainage Composite: Prefabricated sheet drain consisting of a 3-dimensional polypropylene formed dimple core covered with a non-woven polypropylene filter fabric bonded to one side.
   1. Product: Aquadrain 15X.

H. Base Drainage Composite: three dimensional drainage core with a geotextile adhered to both sides to allow water passage while restricting soil particles.
   1. Product: Aquadrain 100BD.

I. Protection Layer: Manufacturer's standard self-adhering fabric reinforced 30 mil rubber protection sheet.
   1. Product: RAP 200

J. Self-Adhering Flashing: 60 mil thick self-adhering flashing membrane.
   1. Product: Envirosheet
   2. Primer: Enviroprimer WB

K. Grade Termination (Below Grade) Sealant/Adhesive: Single component polyether moisture cure sealant/adhesive.
   1. Product: Cetseal

L. Waterstoppage: Chemically treated, granular sodium bentonite.

M. Hose Clamp: Type 316 stainless steel wormgear clamp.

N. Thermoplastic Flashing: Nominal 60 mil thick reinforced thermoplastic flashing membrane.
   1. Product: Coreflash 60

O. Thermoplastic Non-reinforced Flashing: Nominal 60 mil thick non-reinforced thermoplastic flashing membrane.
   1. Product: Coreflash NR

P. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

Q. Polyurethane Sealant: Polyurethane based, caulk grade, single component swelling paste.
   1. Product: Akwaswell

R. Bentonite-filled Tubing: 2 inch diameter, thin, water-soluble tubing filled with granular sodium bentonite.
   1. Product: Volclay Hydrobar Tubes

S. Outdoor Rated Multi-Purpose Tape: Polyethylene, reinforced, multi-purpose pressure sensitive tape with waterproof backing.
   1. Product: Scotch Tough Duct Tape Heavy Duty All-Weather; 3M

T. Pipe Penetration Sleeves: PVC sleeves with 3-inch rib and inter-locking synthetic EPDM rubber links shaped to continuously fill the annular space between the pipe and wall opening.
   1. Century-Line Sleeves; PSI-Thunderline/Link-Seal.

U. Cementitious Board: 1/2” thick cementitious wall board for protection of waterproofing during the removal of metal soldier pile cap and top lagging boards.

V. Tieback Head Covers: Manufacturer’s single piece preformed thermoplastic cover for tie-back heads and soil nails.
   1. Product: TB-Boot
   2. Size must be appropriate for tie-back head or soil nail coverage and be acceptable to the structural engineer.

2.4 HYDRAULIC CEMENT

A. Cement-based, quick-set, hydraulic cement for concrete.
   1. Product: Waterplug; BASF

PART 3 - EXECUTION

3.1 SUBSTRATE INSPECTION AND CONDITIONS

A. Comply with contract documents and manufacturer's product data, including product application and installation instructions.

B. Concrete to receive waterproofing shall be of sound structural grade with a smooth finish, free of debris, oil, grease, laitance, dirt, dust, or other foreign matter which will impair the performance of the waterproofing and drainage system and which do not comply with manufacturer's warranty requirements.
   1. Horizontal application shall be over 3” thick mud slab free of fins, ridges, and other protrusions. Honeycombing, aggregate pockets, tie-rod holes and other voids should be completely filled with non-shrink cementitious grout and level with monolithic concrete surface. Working concrete mud slabs shall have a float finish to provide a planar surface; without sharp angular depressions, voids or raised features.

C. Ensure modular pipe seals have been installed prior to application of waterproofing.

D. The installer, with the Owner’s Independent Inspector present, shall examine conditions of substrates and other conditions under which this Section work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Contractor to coordinate with the Owner’s Independent Inspector.
   1. Do not proceed with work until unsatisfactory conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements.
   2. For conditions not covered in this Section, contact the waterproofing manufacturer for guidance.

E. Wood Timber Shoring: Wood lagging shoring shall extend to the lowest level of the waterproofing installation with any voids or cavities exterior of the lagging timbers filled with compacted soil or cementitious grout. Interior surface of lagging boards shall be planar and tight together with gaps less than 1”. Gaps in excess of 1” shall be filled with cementitious grout, compacted soil, wood, extruded polystyrene (20 psi min.) or CETCO approved polyurethane spray foam. Do not use plywood or other surface treatment over large lagging gaps that leave the cavity void. In areas where lagging gaps are 2-1/2” or less, Aquadrain sheet drainage can be installed over lagging to provide uniform surface to mount the waterproofing without requirement of filling gaps. All lagging board nails and other mechanical projections shall be removed or pounded flush. Install a protection material over all soldier piles with raised lagging hanger bolts, form tie rods, or other irregular surface; protection material shall extend a minimum 6” to both sides of the steel piling.

3.2 SURFACE PREPARATION

A. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the performance of the waterproofing and drainage system.

B. Protect adjacent work areas and finish surfaces from damage or contamination from waterproofing products during installation operations.

C. Honeycombing, aggregate pockets, tie-rod holes and other voids shall be completely filled with non-shrink cementitious grout and level with monolithic concrete surface.

3.3 DRAINAGE COMPOSITE INSTALLATION

A. Install drainage composite in accordance with manufacturer's published instructions and recommendations.

B. At the base of the lagging wall, install base drainage composite horizontally oriented with the open core edge up and the 2" fabric flap side away from the lagging wall. Secure the bottom edge of base drainage composite to the lagging wall with washer-head fasteners every few feet. Use couplers and corner fittings, as required, to form a continuous base drainage composite installation. Install discharge outlet fittings to connect with discharge pipes as required for the project.

C. Install the bottom course of surface drainage composite horizontally oriented (geotextile side against the lagging wall) with the surface drainage composite bottom edge fabric flap tucked behind the top edge of the base drainage composite against the lagging to prevent the passage of soil into the core at the connection. Bottom edge of surface drainage composite core should be in contact with open top core edge of base drainage composite. Place the 2" fabric flap of the base drainage composite over the back of the surface drainage composite core and secure it with CETCO Seamtape. Secure the top edge of base drainage composite to the lagging wall with washer-head fasteners 24" on center.

D. Install subsequent rolls of surface drainage composite to within 12" of finished grade or as shown on the project Drawings. Tightly abut adjoining sheet drain core edges and tuck the extra fabric flaps behind the adjacent roll edge to keep soil from entering the sheet drain. Secure sheet drain to lagging wall with washer-head fasteners.

E. Cementitious Board: Prior to installing surface drainage composite to finished grade elevation, install 1/2" thick cementitious wall board centered over steel soldier pile from finished grade elevation to specified depth that the top of steel soldier pile and wood lagging will be removed. Cementitious wall board will protect waterproofing when top of soldier pile is excavated and removed. Remove cementitious wall board with removal of metal soldier pile head and lagging.

3.4 GENERAL WATERPROOFING INSTALLATION GUIDELINES

A. Install bentonite geotextile composite waterproofing and accessories in accordance with manufacturer's published instructions and recommendations.

B. Property Line Shoring Walls: Install bentonite composite sheet waterproofing with minimum 6" sheet edge overlaps fastened with both washer-head fasteners placed maximum 24" on center and pneumatic staples placed 6" on center. Install pneumatic staples within 1" of sheet edge to tightly secure entire overlap assembly to the shoring wall. Secure center line of bentonite composite sheet waterproofing sheets to shoring wall with washer-head fasteners as required to hold membrane tight against shoring wall.

C. Install bentonite geotextile composite waterproofing with the dark gray woven geotextile side facing the concrete (polyethylene liner side away from concrete) to be waterproofed in both horizontal and vertical applications. Overlap bentonite geotextile composite waterproofing membrane edges a minimum 6" or greater as defined herein. Apply trowel-grade bentonite at seams, penetrations and terminations.

D. Underslab: Install bentonite composite sheet waterproofing with the dark gray geotextile side facing the concrete to be waterproofed in both horizontal and vertical applications. Concrete should be placed against dark gray geotextile side of membrane. Place bentonite geotextile composite waterproofing directly on properly prepared mud slab substrate with adjoining edges overlapped a minimum of 6". Stagger sheet end seams a minimum of 24".

E. Detail penetrations as indicated in the Contract Drawings.

F. Secure sheets with termination bars. Apply grade termination sealant as indicated in the Contract Drawings.

G. Secure termination bars by fastening on one side and working towards the other side. Cut termination bars at corners. Do not wrap termination bar around corners. Termination bars shall be secured at 6 inches on center, unless more stringent requirements are indicated elsewhere.

H. Inspect finished bentonite geotextile composite waterproofing installation and repair any damaged material prior to concrete slab placement.

I. Place protection board prior to backfilling.

J. Seams at joints and corner conditions are not permitted unless specifically indicated.

3.5 INSTALLATION AT SLAB EDGE TRANSITION

A. Install bentonite geotextile composite base corner transition sheet horizontally oriented (poly side against the shoring wall; dark gray geotextile side facing installer) with the bottom edge extending out onto the horizontal substrate a minimum 12" and the top edge of the sheet extending a minimum 12" above the finished slab elevation. Secure bentonite geotextile composite sheet to lagging wall through drainage composite sheet with washer-head fasteners maximum 24" on center. Overlap edges of adjacent bentonite geotextile composite sheets a minimum 6".

B. If the slab thickness is greater than 24", install a second full sheet or cut strip of bentonite geotextile composite on the lagging wall to meet the 12" requirement above of the top slab elevation. Overlap top edge of previous sheet and edges of adjacent sheets a minimum 6".

3.6 BENTONITE GEOTEXTILE COMPOSITE ON LAGGING SHORING

A. Starting at the base corner, install course of bentonite geotextile composite horizontally oriented (poly liner side against lagging; dark gray geotextile side facing installer) to lagging wall over the bentonite geotextile composite transition course previously installed. Secure sheet edges to shoring with both washer-head fasteners placed maximum 24" on center and pneumatic staples placed 6" on center within 1" of sheet edge.

B. Secure center line of bentonite geotextile composite sheets to shoring wall with pneumatic staples or washer-head fasteners as required to secure membrane tight against shoring wall.

C. After the bottom horizontal course, bentonite geotextile composite sheets can be installed either vertically or horizontally oriented. Continue bentonite geotextile composite installation up wall to finished grade elevation detail, staggering all sheet roll ends of adjacent courses a minimum 24". Do not allow horizontal bentonite geotextile composite overlap joints to run at same elevation as the shotcrete lift joints. Plan by chalk lining the location of shotcrete lift joint lines. Overlap adjacent bentonite geotextile composite sheet edges a minimum 6” and set laps in a full bed of trowel-grade bentonite.

D. Tie-Back Heads: For all tie-back heads and soil nails, install waterproofing system with applicable size tieback head cover in accordance with manufacturer’s detail for specific project condition(s). For irregular shoring wall conditions at tie-backs or oversize tie-back heads consult manufacturer for alternate detail for specific project condition(s).

E. Penetrations: For all mechanical, structural and other penetrations install waterproofing system per manufacturer’s detail for specific project condition(s).

F. Rebar Anchorage: Install trowel-grade bentonite 3/4" thick around all rebar anchorage penetrating bentonite geotextile composite. Then install a length of waterstop around the shaft of the rebar anchorage tight against the trowel-grade bentonite.

G. Inspect finished bentonite geotextile composite installation and repair any damaged material prior to shotcrete placement. Assure bentonite geotextile composite overlap is not separated during shotcrete placement.

3.7 UNDER SLAB INSTALLATION

A. Install bentonite sheet waterproofing under all footings, pits, and other areas indicated.

B. Install membrane (poly side down; dark gray geotextile side up) extending to interior edge of footing/slab edge, fully overlapping the 12 inch horizontal tail of the membrane slab edge sheet. Overlap edges of adjacent sheets a minimum 6 inches and secure to prevent sheet movement during construction or concrete placement. Set overlaps in a full bed of trowel-grade bentonite.

C. Place waterproofing directly on properly prepared substrate (poly side down; dark gray geotextile side up facing installer) with adjoining edges overlapped a minimum of 6 inches. Set overlaps in a full bed of trowel-grade bentonite. Stagger sheet end seams a minimum of 24

inches. Mechanically fasten or staple membrane as required to prevent movement from construction operations or concrete placement. When the slab is poured in sections, extend membrane a minimum 12 inches beyond the slab edge to enable proper overlapping.

D. Slab Penetrations: For all pipe, rebar, structural or other penetrations install waterproofing system in accordance with manufacturer's standard detail for specific project condition(s).

E. Inspect finished waterproofing installation and repair any damaged material prior to concrete slab placement.

F. Waterstop shall be installed in all slab joints, around applicable slab penetrations and structural members.

3.8 CAST-IN-PLACE CONCRETE WALLS

A. Attach bentonite sheet waterproofing using washer-headed mechanical fasteners maximum 24" (60 cm) on center and tape overlap with seam tape. Overlap all adjacent sheet edges a minimum 4" (100 mm). Stagger all vertical overlap seams a minimum of 12" (300 mm). Tape all membrane overlap seams with seam tape.

B. After the bottom horizontal course, sheets can be installed either vertically or horizontally oriented. Continue installation up wall to finished grade elevation detail, staggering all sheet roll ends of adjacent courses a minimum 12" (300 mm). Do not allow horizontal overlap joints to run at same elevation as the concrete pour lift joints. Overlap all adjacent sheet edges a minimum 4" (100 mm) and secure with washer-head fastener maximum 24" (60 cm). Tape all membrane overlap seams with seam tape.

C. Terminate bentonite sheet waterproofing as indicated in Drawings. Termination of top of bentonite sheet waterproofing shall occur prior to backfill.

D. Inspect finished bentonite sheet waterproofing installation and repair any damaged material prior to backfill placement. Ensure that bentonite sheet waterproofing is not displaced during backfill placement or soil compaction.

3.9 INSTALLATION AT SINGLE PIPE PENETRATION IN VERTICAL WALL

A. Install pipe penetration sleeves at horizontal pipes over 2 inches in diameter.
   1. Install modular seals in strict accordance with manufacturer's recommendations and written instructions.
   2. Secure pipe sleeves to concrete forms prior to concrete pour.
   3. Install waterstop around pipe penetration sleeve against collar on exterior side.
   4. Loosen rear pressure plate with nuts just enough so links move freely.
   5. Confirm that bolt heads are facing installer.
   6. Slide belt assembly into annular space.
   7. Tighten bolts using a hand socket or wrench starting from the top, working clockwise.
      a. Tighten bolts a maximum of 4 turns at a time.
   8. Tighten bolts clockwise around the pipe until links have been uniformly compressed.
   9. Tighten bolts 2-3 more times at a maximum of 4 turns per bolt clockwise until all sealing elements bulge around pressure plates.
      a. Hand tighten only.
   10. Seals installed incorrectly shall be removed and reinstalled correctly. Replace modular seals that become damaged from reinstallation attempts at no cost to the Owner.
   11. Install cylindrical sealant backings and sealant over installed pipe penetration sleeve gaskets.

B. Install waterstops around pipe penetrations at horizontal pipes 2 inches in diameter or less.
   1. Install two waterstops tightly to pipe penetration 3 inches away from outside faces of wall and each other.
   2. Tightly butt ends to form a continuous waterstop.
   3. Secure with wire ties around pipe penetrations.

C. Install bentonite sheet waterproofing to wall cut tightly around pipe penetration.

D. Provide an additional layer of bentonite sheet waterproofing. Secure sheet to wall extending outward from the penetration a minimum of 8 inches in all directions.

E. Secure bentonite sheet waterproofing with termination bar.

F. Completely cover termination bar and sheet waterproofing seam with trowel grade bentonite.

G. Provide 1 inch of trowel grade bentonite in each direction where bentonite sheet waterproofing meets pipe penetration.

3.10 INSTALLATION AT SINGLE PIPE PENETRATION IN HORIZONTAL SLAB

A. Hydraulic Cement:
   1. Mixing: Mix hydraulic cement in accordance with manufacturer's written recommendations including;
      a. Mix powder neat with clean potable water by hand to a stiff, low-slump, putty consistency.
      b. Mix no longer than 30 seconds
      c. Do not retemper

   2. Place hydraulic cement with minimum working, kneading, or rubbing.
      a. Force hydraulic cement into prepared opening around penetration.
      b. Trowel shave hydraulic cement flush with slab, working from the center out in the direction of the bond line, prior to set.
      c. Keep surfaces damp for 15 minutes minimum using a fine spray misting of water before and after placement.

B. Bentonite Accessories:
   1. General: Install bentonite accessories in accordance with manufacturer's written recommendations, and as indicated in this Section and the Contract Drawings.
   2. Bentonite Granules: Fill excavated area around horizontal slab penetration as indicated and shown in the Contract Drawings
   3. Bentonite Sheet: Cut and secure sheet tightly around pipe penetration extending outward from the penetration a minimum of 6 inches in all directions, and fully covering bentonite granules.

3.11 WATERSTOP INSTALLATION

A. Install waterstop in strict accordance with manufacturer's recommendations and written instructions.

B. Install continuous waterstop a minimum of 3 inches away from exterior face of concrete.

C. Install waterstop in a continuous bead of below grade sealant/adhesive.

D. Tightly butt ends in below grade sealant/adhesive to form a continuous waterstop.

E. Install two strips of waterstop in all horizontal and vertical shotcrete construction cold joints.

F. Install one strip of waterstop in all shotcrete lift joints after the joint surface has been cleaned of rebound, poorly bonded material, or any other defect. Secure by pushing waterstop halfway down into fresh shotcrete. 1-1/2" wide strip of flat surface shall be tooled or formed into the shotcrete surface at rough surfaces to facilitate proper installation of the waterstop.

G. Install one strip of waterstop around all mechanical penetrations extending through the shotcrete foundation.

H. Install one strip of waterstop around all steel reinforcement anchorage.

I. Waterstop shall not be prehydrated. Prehydrated waterstop shall be removed and replaced at no additional cost to the Owner.

3.12 SELF-ADHERING FLASHING INSTALLATION

A. Apply primer as indicated and as recommended by manufacturer to concrete substrates. Allow primer to dry completely prior to installation of self-adhering flashing.

B. Install with adhesive side in direct contact with clean and dry substrate surface without wrinkles or pockets.

C. Install self-adhering flashing with bottom edge overlapping top edge of membrane minimum 4 inches for grade flashings. Overlap roll ends minimum 4 inches.

3.13 MULTIPLE PIPE THERMOPLASTIC FLASHING INSTALLATION

A. Fully hot-air weld thermoplastic non-reinforced flashing to thermoplastic flashing. Refer to Section 07 13 55 “Thermoplastic Sheet Waterproofing with Active Polymer Core” for thermoplastic membrane welding procedures and other requirements for thermoplastic membrane waterproofing.

B. Secure thermoplastic flashing to wall with termination bar at 6 inches on center.

C. Ensure that there are no sharp edges where termination bars meet at corners.

D. Completely cover termination bar in trowel-grade bentonite.

E. Provide polyurethane sealant underneath non-reinforcing membrane and secure membrane with two hose clamps at each pipe penetration.

F. Strip-in thermoplastic flashing with bentonite geotextile composite. Provide trowel grade bentonite along edge of bentonite geotextile composite.

3.14 PROTECTION LAYER INSTALLATION

A. At vertical below-grade positive side waterproofing locations in which water does not drain to storm drain (e.g. typically pits,) completely cover waterproofing with protection layer prior to backfill Work. Comply with protection layer manufacturer’s published instructions.

B. Install sheets lapped so fasteners are not exposed. Exposed fasteners are not permitted. If exposed fastener cannot be avoided, apply below grade sealant/adhesive over fastener to fully conceal and cover fastener.

C. No gap larger than 1/8 inch shall exist between sheets.

3.15 CONCRETE WALL BACKFILL

A. Backfill shall be placed and compacted in accordance with Structural Engineer’s requirements. If Structural Engineer has not established requirements, backfill shall be placed and compacted a minimum of 85 percent Modified Proctor density promptly after waterproofing and protection board has been installed.

1. Closely coordinate with contractor responsible for backfill Work by informing them each time a waterproofed area is ready for backfill.
2. Backfill shall consist of compactable soil or angular aggregate (3/4” or less) free of debris, sharp objects, and stones larger than ¾” (18 mm).
3. Care should be used during backfill operation to avoid damage to the waterproofing system.
4. If damage occurs, cease backfilling and report damage.
5. Damaged waterproofing must be repaired per manufacturer’s guidelines.

3.16 CLEAN UP AND PROTECTION

A. Clean areas where adjacent finished surfaces are soiled by work of this Section. Remove all tools, equipment and remaining product on-site. Dispose of section work debris and damaged product following all applicable regulations.

3.17 PROTECTION

A. Protect installed waterproofing from precipitation and ground water in accordance with manufacturer’s requirements until backfilling and terminations at grade are properly completed.

B. Protect waterproofing from damage by backfilling and other causes.

C. Replace waterproofing materials damaged by precipitation and other causes before and during backfilling.

3.18 WATERPROOFING REPAIRS

A. Upon notification of suspected leakage associated with below-grade waterproofing, the Contractor shall hold a leak-issue meeting to be attended by the Contractor, applicable sub-contractors, the Architect, the Owner, and the Waterproofing Consultant.

1. The Contractor, within 5 business days of the leak-issue meeting, shall submit a written repair plan to the Architect.

2. The Contractor, within 5 business days of submitting the written repair plan, will initiate waterproofing repairs in accordance with the submitted plan.
3. Repairs will be performed by the Contractor at no additional cost to the Owner.

END OF SECTION

SECTION 072100

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Batt insulation.
   2. Rigid Insulation.

B. Related Sections:
   1. Section 072726 – Air Barriers
   2. Section 075400 – Single Ply Polyvinyl Chloride Roofing: Roof Insulation.
   3. Section 078400 – Firestopping: Firesafing insulation.
   4. Section 092900 – Gypsum Board: Acoustical Insulation.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled materials.
   2. Select locally or regionally fabricated products wherever possible.
   3. Select adhesives and sealants meeting LEED requirements.

D. Select adhesives, primers and sealants meeting Cal-GREEN requirements.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for each product.

C. Submit following Informational Submittals: Manufacturer's instructions.

D. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Fiberglass Batt Insulation
      b. Extruded Polystyrene Insulation.
   2. LEED Credit MRc4: Provide Recycled content data for each different product type, size and manufacturer used for the following materials:
      a. Fiberglass Batt Insulation
      b. Recycled content materials claims shall meet the following requirements:
         1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at www.ftc.gov/bcp/grnrule/guides980427.htm.
         2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and post-industrial content, as defined in the document referenced above, used in each product type used.
   3. LEED Credit MRc5: Provide manufacturer name, source of manufacture or final assembly for the following materials:
      a. Fiberglass Batt Insulation.
   4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Adhesive
   5. LEED Credit IEQc4.2: Provide VOC Emissions Data and chemical component limits for the following materials:
      a. Fiberglass Batt Insulation.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish each insulation type from one manufacturer for entire Project, unless otherwise acceptable to Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Identify products with appropriate markings of applicable testing and inspecting organization.

C. Storage and Protection:
   1. Store materials raised off floor or ground and under cover to keep dry.
   2. Protected from weather, direct sun light, contamination, sources of ignition, and damage from construction operations.

PART 2 - PRODUCTS

2.1 INSULATION TYPES

A. Fiberglass Insulation – General Requirements:
   1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.
   2. Use formaldehyde free materials where available.
   3. Maximize use of recycled material with minimum of 20 percent recycled glass cullet.

B. Fiberglass Batt Insulation - Vapor Retarder
   1. General:
      a. Glass fiber composition with integral fire retardant foil reinforced kraft laminate vapor retarder.
      b. R-value: Minimum conditioned R-value of 19 for walls and 30 for soffits - for insulation material only.
      c. Width: Batt width shall be sized for a friction-fit to be self-supporting when installed in stud walls.
   2. Classification: ASTM C665, Type III, Class A.
   3. Thermal resistance: ASTM C518, "R" value of 3.2 per inch of thickness at 75 degrees F mean temperature.
   4. Permeance: 0.02 perms maximum.
   5. Fire rating: ASTM E84, Flame spread 25 or less and smoke development 50 or less.
   6. Acceptable Products:
      a. Flame-Resistant Foil Insulation (FSK-25), CertainTeed
      b. Flame Spread 25 Insulation, Owens Corning.
      c. FSK-25 Thermal-SHIELD, Johns Manville Corporation.

C. Fiberglass Batt Insulation - Unfaced
   1. General:
      a. Glass fiber composition, friction fit type, unfaced.
      b. R-value: Minimum conditioned R-value of 19 for walls and 30 for soffits - for insulation material only.
      c. Width: Batt width shall be sized for a friction-fit to be self-supporting when installed in stud walls.
   2. Classification: ASTM C665, Type I.
   3. Thermal resistance: ASTM C518, "R" value of 3.2 per inch of thickness at 75 degrees F mean temperature.
   4. Fire rating: ASTM E84, Flame spread 25 or less and smoke development 50 or less.
   5. Acceptable Products:
      a. Unfaced Building Insulation, CertainTeed.
      b. Thermal Batt Insulation, Owens Corning.
      c. Unfaced Thermal-SHIELD, Johns Manville Corporation.

D. Extruded Polystyrene Board Insulation:
   1. General:
      a. Not manufactured using chlorofluorocarbons (CFCs) and maximize use of recycled material.
      b. Square edges.
      c. Thermal resistance "R" value: 5 per inch
      d. Thickness: As indicated.
   2. Classification:
      a. Under Slab: ASTM C578, Type V 100 PSI.
   3. Fire Rating: ASTM E84, 1 inch thick test material, flame spread 10 or less, smoke development 200 or less.
   4. Acceptable Products:
      a. Under Slab:
         1) Styrofoam High Load 100 by The Dow Chemical Company.
         2) GreenGuard by Pactiv Building Products.
         3) Foamular by Owens Corning Foamular.

E. Refer to Section 075400 for roof insulation.

F. Refer to Section 078400 for fire safing insulation.

G. Refer to Section 092900 for acoustical insulation.

2.2 ACCESSORIES

A. Insulation Fasteners: Impale clip type with retaining disc or plate, galvanized steel, adhered or mechanically fastened to surface to receive insulation, length to suit insulation thickness, capable of securely fastening insulation in place.

B. Tape: Self-adhering pressure sensitive, compatible with insulation, foil type recommended by manufacturer of insulation.
   1. Fire Rating: ASTM E84, flame spread 25 or less and smoke developed of 50 or less.

C. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
   1. Current requirement refers to the date on which the materials are installed in the building.
   2. SCAQMD Rule #1168 is referenced in section 018113 that was current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
   3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

D. Select adhesives, primers and sealants meeting Cal-GREEN requirements.
   1. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
   2. Sealants and Sealant Primers shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that work of other trades which will be covered by insulation is complete, approved, and tested.

3.2 INSTALLATION

A. General: Comply with Section 017300.

B. Batt Installation:
   1. Install insulation after plumbing, mechanical, and electrical services have been installed.
   2. Provide mechanical fasteners, wire mesh, or other accessories to ensure insulation remains in specified position.

3. Fit insulation tight within spaces and tight to exterior side of plumbing, mechanical, and electric services within plane of insulation leaving no gaps or voids.
4. Butt insulation tightly.
5. Cut and fit tightly around items penetrating insulation.
6. Stagger butt joints.
7. Use batts free of damage.
8. Install insulation within metal framing systems full height and width. Do not allow voids or openings to occur. Insulation is required for full width between studs, including cavity of each stud.
9. Cut and trim insulation neatly, to fit spaces.
10. Cut insulation oversize to ensure tight butt joints when installed. Cut insulation to fit around protrusions and irregularly shaped projections.

C. Batt Insulation with Vapor Barrier:
1. Install insulation with factory applied barrier facing warm-in-winter side of building spaces.
2. Tape seal butt ends and lapped side flanges. Tape and seal tears and cuts in barrier.

D. Under Slab Insulation:
1. Place extruded polystyrene board insulation under slabs where designated after base for slab has been compacted and vapor retarder [barrier] placed.
2. Place insulation with tight butt joints.
3. Prevent insulation from being displaced and damaged while placing slab.

3.3 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect insulation from moisture until building is made watertight.

END OF SECTION

SECTION 07 22 00

ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Tapered insulation.
   2. Tapered edge strips
   3. Substrate board.
   4. Accessories.

B. Fastener pull-out resistance tests performed by the manufacturer's technical representative. Testing shall be performed on walls and in the field of the roof.

1.2 RELATED REQUIREMENTS

A. Section 07 54 00 "Thermoplastic Membrane Roofing;" for roofing system, administrative and warranty requirements.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Submit manufacturer's shop drawings indicating insulation layout, cross section of assembly, and minimum board dimensions on 24"x36" drawings sheets.
   1. Submit drawings indicating slope, ridges and valleys to achieve positive drainage at slopes indicated.
   2. Comply with recommendations of National Roofing Contractors Association (NRCA) Roofing Manual, latest edition.

C. Samples for Verification: For the following products:
   1. Rigid insulation board.
   2. Substrate board.

D. Product test reports.

E. ASCE 07-10 insulation attachment pattern diagram, include field, roof perimeter, and roof corner attachment.

1.4 DELIVERY, STORAGE AND HANDLING

A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

C. Do not overload roof. Load goods so as not to cause structural damage or failure, or create a safety hazard.

D. All materials which are determined by the Owner, Engineer or the manufacturer to be damaged are to be removed from the job site and replaced at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Tapered Rigid Insulation: Polyisocyanurate insulation with inorganic coated-glass facers, including tapered edge strips; ASTM C 1289, with a core density of 2.0 pcf, per ASTM D 1622.
   1. Basis-of-Design: Sarnatherm Tapered.
   2. ASTM C 1289, Type II
   3. ASTM E 108 or UL 790, Class A System
   4. ASTM E 84 or UL 237, Class 1 Rating
   5. ASTM D 1621, Compressive Strength 20 PSI
   6. Thickness: Varies

7. Minimum R-Value: **[Enter minimum R-value]**
8. Panel Size: Insulation panel shall be 4'-0" x 4'-0" maximum.
9. Tapered edge strip at drains shall slope vertically from 0 to 1-1/2 inch in 12 inches horizontal.
10. Concrete Decks: Adhered for deck attachment in accordance with manufacturer's recommendations.
11. Metal Canopy Decks: First layer mechanically fastened for deck attachment in accordance with manufacturer's recommendations. Subsequent layers adhered.
12. Approved by roofing membrane manufacturer for specified warranty.

B. Substrate Board: Glass mat gypsum panel with pre-primed surfaces on front and back; ASTM C 1177, with maximum flame-spread and smoke-developed indexes of 0, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Georgia Pacific; DensDeck Prime
   b. Approved Equal
2. Thickness:
   a. Deck: 1/2"
   b. Walls: 1/4"
3. Width: 4'-0"
4. Length: 8'-0"
5. Surfacing: Fiberglass mat with non-asphaltic coating
6. Flexural strength: 80 lbs. min., ASTM C 473
7. Permeance: 23 perms, ASTM E 96
8. R Value: 0.56, ASTM C 518
9. Water Absorption: 10% maximum, ASTM C 1177
10. Compression Strength: 500-900 PSI
11. FM Class 1, FM 4450
12. UL Class A, UL 790
13. Adhered for horizontal attachment and mechanically attached to vertical substrates, in accordance with manufacturer's recommendations.
14. Approved by roofing membrane manufacturer for specified warranty.

2.2 ACCESSORIES

A. Foam Adhesive for Concrete Deck and Multiple Layer Installation: Primary roofing system manufacturer's standard foam adhesive for bonding rigid insulation board to the concrete roof deck and to other insulation and substrate board to insulation.
1. Subject to compliance with requirements, provide products by one of the following:
   a. Sarnacol 2163; Sika-Sarnafil
   b. Sarnacol AD Board Adhesive; Sika-Sarnafil
   c. FTR 601; FiberTite
   d. Approved equal.
2. Provide foam adhesive accepted by primary roofing manufacturer for specified warranty.

B. Fasteners for Metal Deck: Fasteners to secure insulation to metal decks and substrate boards to walls shall be approved fasteners as recommended and approved by the manufacturer. Fasteners shall be corrosion resistance coated with 3-inch, 26 gauge galvalume coated plates. Length of fasteners shall be sized to provide no less than 1-1/2 inch embedment or 3/4 inch penetration beyond deck.

PART 3 - EXECUTION

3.1 CONDITION OF SURFACES

A. Inspection of Surfaces: Substrate on which insulation and substrate board is to be installed shall be clean, smooth and dry. Condition of substrate shall be inspected and approved by the Contractor, Engineer, and the Owner's Representative immediately before start of installation.

B. Preparation of Surfaces: Check roof deck surfaces for defects before work is started; correct defects and inaccuracies in roof deck surface to eliminate poor drainage, hollow and low spots.
   1. Deck surfaces varying more than 1/4 inch and defects will be repaired by Contractor.

C. Correct defects in existing decks where required by the Engineer.

3.2 PROTECTION OF MATERIALS

A. Keep roof insulating materials and substrate board dry before, during, and after installation. Apply two layers of breathable tarp over rigid insulation and substrate board on a daily and nightly basis. Plastic/visqueen are not acceptable covers.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturers' written instructions applicable to products and applications indicated.

B. Install insulation and substrate board that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation and substrate board to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids greater than 1/8-inch in width with same material. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation and substrate board to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

E. Install accessories in accordance with manufacturers' instructions.

F. Install only as much substrate and insulation board as can be covered with roofing by the end of the workday and prior to inclement weather.

3.4 INSTALLATION OF INSULATION AND SUBSTRATE BOARD

A. Layout of Insulation/Substrate Board: Install insulation and substrate board over the properly prepared decking.
   1. Multiple-Layer Installation: Board thickness greater than 2 inches shall be installed in multiple layers and shall be 2 inches maximum per layer.
   2. Boards to be loosely laid with all joints staggered and offset 12-inches minimum from adjacent rows and from joints of board layer below.
   3. Closely cut each board to tightly fit around all roof penetrations.
   4. No boards shall be cut to less than 1 square foot in size.
   5. Fit each board snugly against adjacent boards so that no gap larger than 1/8 inch exists.
   6. Carefully inspect the installation to ensure that each board fits flush with adjacent boards.
   7. Boards with broken corners or that display cupping or warping shall not be used.

B. Adhere insulation to properly prepared concrete deck. Mechanically attach first layer of insulation to metal deck.

C. Adhere substrate board to insulation board. Mechanically attach substrate board at vertical applications.

D. Crickets: Install crickets at the high side of all curbs or other obstacles 24-inches or wider blocking positive drainage to roof drains or scuppers, and at locations indicated.
   1. Carefully layout each cricket to ensure positive roof drainage and no possibility of roof ponding.
   2. Crickets shall smoothly transition between changes in slope. Provide tapered edge strips to avoid voids at toe of crickets.

E. Foam Adhesive Attachment of Rigid Insulation and Substrate Board at Horizontal Applications (Concrete Deck and Metal Deck except 1st layer): Using a ribbon pattern space 1/2 inch wide beads of foam at 8 inches on center. If fastening pattern set by manufacturer or necessary to meet ASCE 07-10 wind uplift requirements exceeds those of this section, the more stringent fastening requirements are to be followed. Fastening pattern to be increased in corners and perimeters per the requirements of ASCE 07-10. As adhesive is applied, immediately place board into wet adhesive. Do not allow adhesive to skin over. Eliminate un-even surfaces to ensure positive contact between the board and substrate. Foam cannot be applied to a wet substrate.

F. Mechanical Attachment of Rigid Insulation at Horizontal Applications (1st Layer at Metal Deck): Fasten through insulation board with non-corrosive screws and plates, minimum spacing to be one fastener per every four square feet. If fastening pattern set by manufacturer or necessary to meet ASCE 07-10 wind uplift requirements exceeds those of this section, the more stringent fastening requirements are to be followed. Fastening pattern to be increased in corners and perimeters per the requirements of ASCE 07-10.

1. Take necessary precautions to ensure that fasteners do not penetrate conduit or miscellaneous piping below the decking.

G. Mechanical Attachment of Substrate Board at Vertical Applications: Fasten through substrate board with non-corrosive screws, minimum spacing to be 8 inches on center vertically with vertical rows spaced 16 inches apart. Minimum fastener spacing of 12 inches on center at top and bottom.

3.5 PROTECTION OF APPLIED INSULATION AND SUBSTRATE BOARD

A. Completely cover applied insulation and substrate board with finished roofing system. Protect open spaces between insulation and substrate board and walls and spaces at curbs, until permanent roofing and flashing is applied. Insulation and substrate board may not be left uncovered overnight.

B. In finished areas, storing walking, wheeling or trucking will not be permitted. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary to distribute weight to conform to indicated live load limits or roof construction.

END OF SECTION

SECTION 072600

VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Vapor retarders for use below slabs-on-grade.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select locally or regionally fabricated products wherever possible.

1.2 DEFINITIONS

A. Perm: 1 grain/h•ft^2•in-Hg.

1.3 SUBMITTALS

A. General: Submit following items in accordance with Section 013300.

B. Product Data: Submit product data for each product, including tape.

C. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Vapor Retarders.
   2. LEED Credit MRc5: Provide manufacturer name, source of manufacture or final assembly for the following materials:
      a. Vapor Retarders.

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000

1.5 SEQUENCING

A. Begin installation only after substrate work is complete and penetrations are securely anchored.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vapor Barrier (15 mil):
   1. Provide materials tested for use under slab-on-grade and successfully passing ASTM E154, Sections 8, 11, 12, and 13.
      a. Material shall conform to the requirements under the following conditions: when tested in accordance with
         1) Test Methods ASTM E154, Section 7 (based on Test Methods ASTM E96/E96M), or Test Method ASTM F1249, test temperature shall be 73.4°F (23°C) and test humidity shall be 50 +/- 2 %.
         2) 7.1.1 Permeance of New Material—No conditioning.
         3) 7.1.2 Permeance after Wetting, Drying, and Soaking—Refer to Test Methods ASTM E154, Section 8.
         4) 7.1.3 Permeance after Heat Conditioning—Refer to Test Methods ASTM E154, Section 11.
         5) 7.1.4 Permeance after Low Temperature Conditioning—Refer to Test Methods ASTM E154, Section 12.
         6) 7.1.5 Permeance after Soil Organism Exposure—Refer to Test Methods ASTM E154, Section 13.
   2. Virgin waterproof metallocene polyolefin film; recycled materials not allowed.
   3. Comply with ASTM E1745, Class A minimum.
   4. Tensile Strength: 45 pound/inch minimum, ASTM E154, Section 9.
   5. Permeance: ASTM E96, Procedure A; 0.009 perms maximum.

6. Puncture Resistance: 2200 grams minimum, ASTM D1709, Method B
7. Acceptable Product:
   a. Stego Wrap15 mil Class A, Stego Industries, LLC.
   b. Husky Yellow Guard, Poly-America.

B. Joint Tape: Manufacturer's recommended, pressure sensitive type, self adhering, and of perm rating not less than vapor retarder.

C. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify that substrate work is complete, clean and dry before beginning installation of sheet products.

3.2 INSTALLATION

A. Under Slab-on-Grade:
1. Install vapor retarder in accordance with manufacturer's written instructions, ACI publication 302 "Guide for Concrete Floor and Slab Construction", and ASTM E1643.
2. Lay-out sheets to minimize quantity of joints. Lap edge and end joints 12 inches minimum and continuously seal with joint tape. Lay sealant bead or double stick tape between layers that overlap.
3. Seal penetrations, including pipes, with manufacturer's pipe boot. Seal around pipes, plumbing risers, electrical conduit, other slab penetrations.
4. Turn up sheets 12 inches at perimeter; at footers and vertical walls, and against penetrations. Seal joints and terminations with tape. Cut off excess material after concrete has been installed and reviewed by the Architect.

3.3 PROTECTION

A. Protect sheets from puncture during installation. Patch punctures before proceeding with subsequent construction.

B. Install runway planks in construction traffic lanes until slabs are poured.

C. Patches: Lay patch over damaged areas and seal around patch using same method described above for overlapping sheets.

END OF SECTION

SECTION 074212

PREFORMED METAL ROOF SCREEN PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Factory formed, field assembled perforated acoustical metal screen panels for installation around rooftop items, complete with related framing, closures, trim, and accessory components.
   2. Supplementary framing, clips, anchoring devices, fasteners, and accessories.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.
   3. Select adhesives and sealants meeting LEED requirements.

1.2 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of metal wall panel system.
   3. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   4. Make modifications only to meet field conditioned and to ensure fitting of system components.
   5. Obtain Architect's approval of modifications.
   6. Attachment considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
   7. Obtain Architect's approval for connections to building elements at locations other than indicated in Drawings.
   8. Accommodate building structure deflections in system connections to structure.

B. Performance Requirements:
   1. System to accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to seasonal temperature changes and live loads.
   2. Design framing to accommodate maximum L/180 deflection under live loading with adjustable connection to building frame which will accommodate building tolerances and live load movements.

C. Interface With Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections for structural members in installation.

1.3 SUBMITTALS

A. General: Submit following items in accordance with Section 013300.

B. Product Data:
   1. Submit product data for each product.
   2. Include information for factory finishes, hardware, sealants, accessories, and other required components.
   3. Include color charts for finish indicating manufacturer's full range of colors available for selection.

C. Shop Drawings:
1. Stamp shop drawings with seal and signature of professional engineer responsible for design.
2. Submit total layout, including dimensions, construction details, profiles, supports, anchorage, trim, flashing, and methods of anchorage and attachment.
3. Show details at edges, terminations, and change of profiles.
4. Indicate panel terminations and transitions, including intersections with masonry, roof panels, and change of direction pieces.
5. Clearly indicate field and factory applied sealant locations.
6. Show fasteners.
7. Include elevation showing complete layout of each wall.

D. Closeout Submittals:
1. Submit under provisions of Section 017800.
2. Warranty: Submit specified warranty.

E. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
a. Metal Wall Panels
2. LEED Credit MRc4: Provide Recycled content data for each different product type, size and manufacturer used for the following materials:
a. Metal Wall Panels
b. Recycled content materials claims shall meet the following requirements:
1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at www.ftc.gov/bcp/grnrule/guides980427.htm.
2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and post-industrial content, as defined in the document referenced above, used in each product type used.
3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
a. Silicone Sealant and Primer, if used.

1.4 QUALITY ASSURANCE

A. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of metal wall panel systems.

B. Manufacturer Qualifications:
1. Company specializing in factory fabrication of metal wall panels.
2. Minimum 10 years documented experience.

C. Installer Qualifications:
1. Company specializing in installation of metal wall panel systems.
2. Minimum 5 years documented experience in similar sized installations.
3. Installation foreman is required to have at least 10 years experience installing specified products.

D. Certifications:
1. Submit manufacturer's certification that system, including materials and finishes, furnished for Project meet or exceed specified requirements.
2. Engineering Certifications.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

B. Protection:
   1. Protect products and accessories from damage and discoloration during transit and at Project site.
   2. Store materials on built-up surfaces.
   3. Slope panels for drainage, and to protect against damage by weather and construction operations.

1.6 WARRANTY

A. Comply with provisions of Section 017800.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. Steel: Maximize use of recycled steel with minimum of 30 percent.

B. Structural Quality Aluminum-Zinc Alloy-Coated Steel Sheet:
   1. Hot-dip aluminum-zinc-coated steel sheet (Galvalume) complying with ASTM A792 with class AZ-50 coating.
   2. Grade 40 or to suit manufacturer's standards.

C. Perforated Acoustical Metal Panel:
   1. Panel Thickness: 2-3/4 inches.
   2. Perforations: 3/32 inch holes on 3/16 inch staggered centers, providing 23% open area.
   3. Field calked side joints to receive exposed fasteners.
   4. 36 inches wide by 1-1/2 inches deep profile, with flutes on 7.2 inch centers; 5 flutes per panel.
   5. Metal Thickness: 20 gage.
   6. Provide perforated metal panels; perforation pattern, size, and percent of openness as selected by Architect.
   7. Internal Bracing: 18 gage channel/stiffener framing.
   8. Acoustical Insulation: 2 inches thick, 2.5 pcf density fiberglass sound absorber encased in a 2 mil thick black PVC embossed vinyl.
   9. Sound Absorption (ASTM E795, A mounting): Noise Reduction Coefficient of 0.90.
   10. Mounting Accessories: Flush-mount, Z-channel (flashing) top and flush-mount, J-channel(flashing) bottom.
   11. Color: Gray.
   12. Basis-of-Design Product: Kinetics Noise Control, KNP-V Groove Panels.

D. Internal and External Corner Trim:
   1. Same materials, thickness, and finish as adjacent panels.
   2. Profile to suit system; brake formed to required angles.
   3. Mitered internal corners, back braced to maintain continuity of profile.

E. Trim, Closure Pieces, and Accessories:
   1. Same material, thickness, and finish as adjacent metal panels, brake formed to required profiles.
   2. Comply with standards conforming to recognized industry standard sheet metal practice.

F. Fasteners:
   1. 300 series stainless steel with neoprene washers and exposed screw head color matched to adjacent panel where exposed. Use exposed fasteners only where absolutely necessary to attach trim.
   2. Provide metal-backed neoprene washers under heads of exposed fasteners bearing on exterior side of panels.

G. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
   1. Current requirement refers to the date on which the materials are installed in the building.

2. A copy of SCAQMD Rule #1168 is included in section 018113 that was current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

2.2 FABRICATION

A. Forming:
   1. Factory form, uniformly dimension, one-piece lengths to avoid field cutting where possible.
   2. Fabricate panels with seams that overlap for entire length.
   3. Minimize intermediate panel seams.

B. Fabrication of panels on site not permitted.

C. Apply finish coatings prior to roll forming.

2.3 FINISH

A. Exterior Panel Surfaces: Final painting under Section 099000 - Painting and Coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Examine framing and adjacent surfaces for conditions that would adversely affect execution.

C. Examine alignment of support system and verify that acceptable tolerances have been met.

3.2 INSTALLATION

A. Install system in accordance with Section 017300.

B. Fastening:
   1. Provide expansion and contraction movement capability as necessary.
   2. Permanently shim and fasten panel system to framing system at spacing required by panel manufacturer.
   3. Align, level, and plumb, within specified tolerances.
   4. Use concealed fasteners for flat panels; exposed fasteners may only be used on portions of applied trim if necessary.
   5. Locate and space exposed fasteners in true vertical and horizontal alignment.
   6. Use proper tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.

C. Install accessories, flashings, closures, and related trim to provide complete watertight system.

D. Seal and place gaskets to prevent weather penetration.

E. Coordinate installation of panels with adjacent construction to ensure watertight enclosure.

F. Tolerances:
   1. Maximum offset from true alignment between adjacent members butting or in line: 1/8 inch.
   2. Maximum variation from plane or location indicated on Drawings: 1/4 inch.

G. Field adjust and align using adjustments within fastening methods.

3.3 CLEANING

A. Perform wipe-down cleaning as work progresses.

3.4 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect panel system from damage, staining, or soiling after installation. Replace components which have been scratched, dented, or otherwise showing signs of damage or improper installation.

END OF SECTION

SECTION 074243

COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Prefinished, composite panel, dry glazed wall system.

B. Related Sections:
   1. Section 054100 – Structural Metal Stud Framing.
   2. Section 079200 – Joint Sealants.

1.2 SYSTEM DESCRIPTION

A. System Requirements:
   1. Rout and Return Dry: Panel system utilizing continuous edge gripping perimeter aluminum extrusion with integral concealed gasket type weatherstripping, gutter, and weeps. No field sealant required at typical joints. System requires sealed sheathing back-up, specified in Section 061643.

B. Design Requirements:
   1. Fabricator: Responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to certify compliance with system performance requirements.
   3. Drawings: Diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   4. Provide concealed fastening typically.
   5. Attachment Considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connections.

C. Performance Requirements: Certify compliance with requirements specified in Section 01190 and as listed below, based on manufacturer's test data for testing conducted by independent laboratory. If current test results not available, conduct testing to certify compliance.
   1. Maximum Perimeter Framing Deflection: Normal to plane of wall between supports, deflection of secured perimeter framing members shall not exceed L/175 or 3/4 inch, whichever is less.
   2. Maximum Panel Deflection: Not exceed L/60 of full span normal to plane of wall.
   3. Maximum Anchor Deflection: Not exceed 1/16 inch.
   4. Maximum Permanent Deflection of Framing Members: Not exceed L/100 of span length at 1-1/2 times design pressure and components shall not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed 1/16 inch.
   5. Bond Integrity: When tested for bond integrity, ASTM D1781 (simulating resistance to panel delamination), there shall be no adhesive failure of bond between core and skin nor cohesive failure within core, based on following values.
      a. Bond Strength: 214 PSI (Vertical Pull)
      b. Peel Strength:
         1) 22.5 inch pound/inch dry.
         2) 22.5 inch pound/inch after 8 hours in water at 200 degrees F.
         3) 22.5 inch pound/inch after 21 days soaking in water at 70 degrees F.
   6. Tolerances
      a. Panel Bow: Maximum 0.8 percent of panel dimension in width and length for 72 inch panel.

b. Maximum deviation from panel flatness shall be 1/8 inch in 5 feet on panel in each direction for assembled units. (Non-accumulative)

D. Interface With Adjacent Systems:
1. Integrate design and connections with adjacent construction.
2. Accommodate allowable tolerances and deflections for structural members in installation.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit following:
1. Product data for entire system, including panels, gaskets, seals, gutters, weeps, flashings, and finishes.
2. Color charts for finish indicating manufacturer's colors available for selection.
3. Sample of warranty customized for this project.

C. Shop Drawings: Submit for installation of system, including panel fabrication, jointing, corners, flashing, seals, gaskets, gutters, weeps, copings, fascia, soffits, and accessories.
1. Stamp with seal and signature of professional engineer responsible for design.
2. Submit detail drawings of panel connections, gasket details, and gutter and weep details.

D. Samples: Submit minimum[(3 by 5 inch)] in size illustrating composition and color.

E. Informational Submittals: Submit following packaged separately from other submittals:
1. Design data for system indicating compliance with design requirements.
2. Test Reports: Certified test reports showing compliance with performance requirements.
3. Certifications specified in Quality Assurance article.
4. Qualification Data: Engineer's qualification data.
5. Qualification Data: Manufacturer's qualification data.
6. Qualification Data: Fabricator's qualification data.
7. Manufacturer's instructions.
8. Manufacturer's field reports.

F. Closeout Submittals: Submit warranty in accordance with Section 017800.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish each product from one manufacturer, unless otherwise acceptable to Architect.

B. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of five years experience in design of metal wall systems.

C. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years experience.

D. Fabricator Qualifications: Company specializing in fabricating work specified in this Section with minimum five years experience.

E. Installer Qualifications: Certified acceptable to manufacturer with experience on at least five projects of similar nature in past five years.

F. Certifications:
1. Manufacturer's certification that Installer is approved to perform work.
2. Manufacturer's and fabricator's certification that products furnished for Project meet or exceed specified requirements.
3. Submit coating manufacturer's certification stating fluoropolymer coating formulation is fluorosurfactant free (FSF).
4. Engineering Certifications.

1.5 FIELD SAMPLES

A. General: Comply with Section 014500.

B. Sample Installation:
1. Construct sample panel 4 feet long by 6 feet wide as directed.
2. Show jointing, corners, gaskets, weep and gutter, and typical construction techniques.

3. Accepted Field Sample: May [not] remain part of completed Work.

1.6 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Section 016000.

B. Packing, Shipping, Handling, and Unloading: Protect finish panel faces, including plastic sheet protection wrap.

C. Acceptance at Site: Inspect each panel and accessory as delivered and confirm that finish is undamaged. Do not accept damaged panels.

D. Storage and Protection: Comply with manufacturer's printed requirements.

1.8 PROJECT CONDITIONS

A. Environmental Requirements: Comply with manufacturer's written requirements under which products can be installed.

B. Existing Conditions:
1. Field verify existing conditions prior to fabricating work of this Section.
2. Verify that field measurements are as indicated on Shop Drawings.

1.9 WARRANTY

A. Special Warranty: Prepare and submit in accordance with Section 017800.
1. Contractor: Warrant installed system and components to be free from defects in material and workmanship for period of 5 years.
   a. Include coverage against leakage and damages to finishes.
2. Factory Finish: 20-year Warranty Stating Finish will be:
   a. Free of fading or color change in excess of 5 Delta E units, ASTM D2244;
   b. Will not chalk in excess of numeral rating of 8 for colors and 6 for whites, ASTM D4214;
   c. Include coverage for cracking, crazing, fading in excess of Vertical 5 and Non-vertical 5.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Alucobond FR, Alcan Composites, Inc. Spectra finish or a comparable product of one of the following:
1. Alpolic FR, Mitsubishi Chemical
2. Reynobond FR, ALCOA, Pittsburgh, PA.
3. UNA-FAB Composite Panels, Firestone Metal Products,:LLC.

2.2 MATERIALS

A. Composite Panels:
1. Fire-retardant aluminum faced panel with thermoplastic core.
   a. Overall Panel Thickness: 0.157 inches.
   b. Aluminum Face and Backer Sheet Thickness: 0.0197 inches.
   c. Aluminum Alloy: ASTM (B209) at 3003 or 3105 at coated finish.

B. Composition: Two sheets of aluminum sandwiching core of extruded thermoplastic material formed in continuous process with no glues or adhesives between dissimilar materials. Products laminated sheet by sheet or in batch process using glues or adhesives between materials shall not be acceptable.

C. Fire Resistance Requirements, Panels and Joints:
1. ASTM E84: Maximum Flame Spread 15; Smoke Developed 30.
2. ASTM E162: No surface flaming.
3. UL 1715: No flame spread along interior face or penetration through wall assembly.

2.3 COMPOSITE PANEL SYSTEM

A. Characteristics:
   1. Rout and Return Dry:
      a. System provides perimeter aluminum extrusion with integral weather-stripping as detailed on Drawings.
      b. Provide drainage to the exterior face of wall for any leakage of water at the joints and/or condensation taking place within the construction.
      c. Overall panel system thickness shall be 2.0 inches.
      d. Panel joint is 1/2 inch at extrusions unless noted otherwise.
   2. No visible fasteners, telegraphing, or fastening on the panel faces.
   3. Comply with applicable provisions other “Metal Curtain Wall, Window, Storefront, and Entrance Guide Specification Manual” by AAMA and ANSI.AAMA 302.9 requirements for aluminum windows.
   4. Fabricate panel system to dimension, size, and profile indicated on the drawings based on a design temperature of 70F.
   5. Fabricate panel system so that no restraints can be placed in the panel, which might result in compressive skin stresses. The installation detailing shall be such that the panels remain flat regardless of temperature change and at al times remain air and water tight.
   6. Perimeter Extrusions: Extruded aluminum with integral weather-stripping as detailed on Drawings, so as to provide the following essential features:
      a. Exposed edges of the panel shall be protected inside an extruded aluminum pocket.
      b. The panel shall be mechanically attached to all perimeter extrusions.
      c. Do not substitute sealants for dry gasketing shown at the metal panel joinery.

2.4 MISCELLANEOUS METAL FRAMING

A. Subframing: C- or Z-shaped sections fabricated from 0.0598-inch bare steel thickness, shop-painted, cold-formed, metallic-coated steel sheet.

B. Zee Clips: 0.079-inch bare steel thickness, cold-formed, galvanized steel sheet.

C. Base or Sill Angles or Channels: 0.079-inch bare steel thickness, cold-formed, galvanized steel sheet.

D. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
   1. Minimum Base Metal Thickness: 0.0179 inch.
   2. Depth: As indicated.

E. Cold-Rolled Furring Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange.
   1. Depth: As indicated.
   2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
   3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
      a. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

F. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.5 FABRICATION

A. Fabricate panels with rout and return edges.
   1. Provide sharp edges with maximum 1/8 inch radius; reinforce and seal corners.
   2. Provide hidden stiffeners and reinforcing if necessary to maintain flat panels or custom shapes as indicated on Drawings.
   3. Fabricate panels for wet sealant joints.
   4. Fabricate panels to sizes and shapes indicated.
   5. Fabricate panels to maintain uniform joint sizes with adjacent panels.

2.6 ACCESSORIES

A. Sealants: Refer to Section 079200.

B. Extrusions, formed members, sheet, and plate: Formed aluminum sheet and recommendations of the manufacturer, minimum 0.030 inch, ASTM B 209, finished to match panels.

C. Panel Stiffeners: As recommended by panel system manufacturer, mechanically fastened or restrained at the ends and secured to the rear face of the composite panel with silicone of sufficient size and strength to maintain panel flatness.

D. Sealants and Gaskets: As recommended by panel system manufacturer.

E. Flashing: 0.062 inch minimum thickness aluminum sheet painted to match the adjacent curtain wall/panel system where exposed. Provide a lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bed of non-hardening sealant.

F. Fasteners: As recommended by panel system manufacturer sized to anchor properly into steel studs or furring anchors attached to structural framing system. Match panel finish where exposed fasteners cannot be avoided.

2.7 FINISH

A. Fluoropolymer Coating (Kynar 500 or Hylar 5000):
   1. Comply with AAMA 620; fluorosurfactant free (FSF) formulation.
   2. Resin: 70 percent polyvinylidene fluoride (PVDF).
   3. Substrate: Cleaned and pre-treated.
   4. Primer:
      a. Manufacturer's standard resin based compatible coating.
      b. Dry Film Thickness:
         1) Extrusion: Minimum 0.20 mil.
         2) Coil: Minimum 0.80 mil.
   5. Color coat:
      a. Coating: PVDF.
      b. Dry Film Thickness:
         1) Coil: 0.80 mil.
         2) Extrusion: 1.0 mil.
   6. Clear coat:
      a. Coating: PVDF.
      b. Dry Film Thickness:
         1) Coil: 0.50 mil.
         2) Extrusion: 0.40 mil.
   7. Color: Manufacturer's standard colors as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Examine conditions and proceed with work in accordance with Section 017300.

B. Confirm that framing system is even, smooth, sound, clean, dry, and free from defects.

3.2 INSTALLATION

A. Composite Panels: Erect panel system in accordance with Section 017300, and approved shop drawings, plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.

B. Anchor panels securely. Allow for thermal movement and for connection to structure.

C. Install with concealed fastener system, including panels, integral gutter and weep system, flashing, fascia, soffits, and related components. Maintain uniform joint widths. At Rout and Return Wet System, install backer rod and sealant in accordance with Work of Section 079200 - Joint Sealants.

D. Site Tolerances: Maximum deviation from vertical and horizontal alignment of erected panels: 1/4 inch in 20 feet non-accumulative.

3.3 FIELD QUALITY CONTROL

A. Request site attendance of manufacturer technical representative during various stages of installation of wall panel installation.

B. Manufacturer's Field Services:
   1. Comply with requirements of Section 014000.
   2. Provide inspection to ascertain specified material and workmanship quality is being maintained and for purposes of warranty verification.
   3. Perform final inspection after wall panel completion.
   4. Field Reports: Submit summary of Project site observations, instructions and monitoring activities.

C. Correct identified defects or irregularities.

3.4 CLEANING

A. General: Comply with Section 017400.
   1. Clean as recommended by manufacturer. Do not use materials or methods which may damage finished surfaces or surrounding construction.

3.5 PROTECTION

A. Protect finished work in accordance with Section 17300.

END OF SECTION

SECTION 07 54 00

THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes furnishing and installation of the following:
   1. Adhered felt-backed thermoplastic membrane roofing system.
   2. Completed roof system shall include all insulation, flashings, accessories, terminations, and other construction necessary to provide a leak-free, ponding-free roofing system.

B. Fastener pull-out resistance tests performed by the manufacturer's technical representative. Testing shall be performed on walls and in the field of the roof.

1.2 RELATED REQUIREMENTS

A. Section 07 22 00 "Roof and Deck Insulation;" for insulation and substrate board.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: At least seven (7) working days prior to starting the application of the roofing system and insulation, conduct and coordinate a preinstallation meeting with Owner, Engineer, Contractor including personnel directly responsible for the installation, manufacturer's representative, and Contractors whose work interfaces with or affects the Work of this Section including Contractors of roof accessories.
   1. Provide all Submittals and shop drawings for approval a minimum of (7) days prior to preinstallation meeting.
   2. Ensure a clear understanding of the Contract Documents.
   3. Provide on-site inspection and acceptance of the roofing substrate.
   4. Coordinate the work of the various trades involved in providing the roofing system and other components secured through the roofing.
   5. The Contractor shall attend the conference with personnel directly responsible for the installation of roofing, substrate board, insulation, flashing and sheet metal work, plumbing, and the roofing materials manufacturer. Conflicts shall be resolved in writing.

B. Weekly meetings – Coordinate and schedule work with the Engineer and the Owner. While work is in progress, Contractor shall attend a mandatory work in progress meeting once a week, on a predetermined time and day. Contractor's representative needs to be able to make ongoing decisions regarding schedule, change orders, quality of workmanship, etc.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include MSDS for each product as applicable.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work. Include flashings, tie-ins, edges, terminations, expansion joints, penetrations and joints. Provide shop drawings for assemblies indicated below. Do not copy and provide Engineer's construction drawings as shop drawings.
   1. Flashing terminations.
   2. Layout and quantity of walkway pads. Include plans, dimensions, connection to roof, and relationship to adjacent roofing appurtenances.
   3. All membrane-clad sheet metal configurations.
   4. Layout of tapered insulation and/or crickets including, but not limited to, slope, heights from drain, connections/securement to structural deck.
   5. Shop drawing showing Manufacturer's required number of perimeter half sheet for project specific uplift requirements, per building.
   6. Shop drawing showing Manufacturer's required plate and fastener spacing pattern for both half sheets and field sheets for project specific uplift requirements, per building.

7. Shop drawing showing Manufacturer's required plate and fastener spacing pattern for perimeters, base of walls, curbs, vent pipes or any other roof penetrations for project specific uplift requirements, per building.

C. Samples for Verification: Samples of each primary component to be used in the roofing system including, but not limited to, the following:
1. Membrane roofing, of color specified.
2. Membrane-clad metal, of each condition in color(s) selected.
3. Flashing materials.
4. Sealant, 11 ounce tube.
5. Fasteners and plates, each type used.

D. Certificates: Signed by manufacturer certifying that Contractor is a factory authorized certified applicator in good standing with the manufacturer and is qualified to perform the specified work and able to receive the required warranties.

E. Certifications: Contractor's recent work history data of successful warranted installations similar to that of this Project within the last 5 years.

F. Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
1. Submit evidence of compliance with performance requirements.

G. Certificates: By manufacturers of roofing and accessory materials that all materials supplied comply with all requirements of the identified ASTM and industry standards or practices.

H. Certificates: From the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.

I. Test Reports: UL Class A Fire Resistance approval.

J. Sample Warranties: Sample copies of manufacturer and Contractor warranties.

1.5 CLOSEOUT SUBMITTALS

A. An annotated as-built Roof Map showing the location of all test samples taken and their catalog numbers, slopes of crickets, insulation thickness, all roof penetrations test cut locations and results including mechanical, electrical, structural, custom curbs, and drains.

B. Full size record drawings set (as-builts).

C. Manufacturer's technical representative's field quality-control reports.

D. Operation and Maintenance Data.

E. Warranty Documentation.

1.6 EXTRA STOCK MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
1. Furnish three full 6'-0" wide roll of roofing material.
2. Furnish six 11 ounce tubes of sealant.

1.7 QUALITY ASSURANCE

A. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Owner, the Owner's Representative and the manufacturer.

B. Standard Test Methods for Fire Tests of Roof Coverings: Class A; UL 790

C. Manufacturer Qualifications: Qualified manufacturer with staff available for the Project to provide site visits, with inspections and written reports, performed by a technical representative of the roofing membrane manufacturer at the intervals below. Contractor to coordinate manufacturer site visits and field reports.
1. Pre-installation meeting.
2. Final inspection for issuance of warranty by a technical representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes.

3. Contractor to submit copies of reports to the Engineer within 7 days of the site visit.

D. Contractor Qualifications: Qualified firm that is authorized by the membrane manufacturer prior to execution of agreement and is able to install manufacturer's products for the specified warranty.
1. Firm shall have successfully completed manufacturer's training as required.
2. Contractor personnel trained and authorized by the manufacturer shall complete all work pertaining to the installation of the Work of this Section, including membrane and flashings.
3. Use adequate amounts of such qualified workmen who are thoroughly trained in the crafts and techniques required to properly install the type of roofing system specified and other work required to complete the Work specified and within the specified time.

E. Source Limitations: No private labeled roofing membrane allowed. Manufacturer shall produce their own membrane. Obtain components for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer. Each component of roofing system shall be by single manufacturer and shall not vary on the Project.

F. Suitability of Contract Documents: Verify that the Contract Documents are workable and not in conflict with the manufacturers' recommendations and instructions prior to the start of the Work.
1. Start of the Work constitutes acceptance of project conditions and requirements.

G. Thermoplastic membrane roofing and associated Work shall be in compliance with NRCA recommendations. Where requirements of the Contract Documents are more stringent, the more stringent shall apply.

1.8 REGULATORY REQUIREMENTS

A. Conform to California Building Code for roof assembly, fire hazard requirements and balance of requirements on the Project.

B. Conform to applicable City, County, State, and Federal requirements.

C. The applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance.
1. American Society of Civil Engineers – ASCE 7; Current Edition.
2. Underwriters Laboratories, Inc. - Northbrook, IL: Class A assembly

D. Conform to the requirements of the following regulatory agencies:
1. Bay Area Air Quality Management District
2. OSHA
3. EPA
4. Local City and County Authorities

E. The Contractor shall be responsible for obtaining all necessary permits for demolition of existing roof and installation of new roofing. Coordinate the required inspections with the local authorities as required.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver roofing materials to the Project site in manufacturer's original, unopened packages and containers bearing the manufacturer's name and label, and the following information as applicable:
1. Product name or title of material.
2. Manufacturer's stock number and date of manufacture.
3. Contents by volume, for pigment and vehicle constituents.
4. Installation/application instructions.
5. Color name and number.
6. Handling instructions and precautions.
7. VOC content.

B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

C. Membrane rolls shall be stored lying down on pallets. Opened rolls shall be fully protected from the weather with clean canvas tarpaulins. Un-vented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions.

D. Do not overload roof. Load goods so as not to cause structural damage or failure, or create a safety hazard.

E. All adhesives shall be stored at temperatures between 40 degrees F and 80 degrees F unless manufacturers require more stringent temperature limits.

F. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.

G. All materials which are determined to be damaged by the Engineer, Owner or the manufacturer are to be removed from the job site and replaced at no cost to the Owner.

H. Keep storage area neat and orderly.

1.10 FIELD CONDITIONS

A. Only as much of the roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams, including flashings, shall be cleaned and heat-welded before leaving the job site that day.

B. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.

C. All surfaces to receive new materials shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application. Do not apply roofing to damp or wet substrate.

D. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

E. Uninterrupted waterstops shall be installed at the end of each day's work, regardless of forecasted weather, and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

F. Certain membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with the specified membrane. The Contractor shall consult the manufacturer regarding compatibility, precautions, and recommendations.

G. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over membrane or plywood over insulation board shall be provided for all new and existing roof areas which receive rooftop traffic during construction.

H. Prior to and during application, all dirt, debris and dust shall be removed from surfaces by methods approved by the manufacturer.

I. The Applicator shall conduct fastener pullout tests in accordance with the latest revision of the SPRI/ANSI Fastener Pullout Standard to verify condition of deck/substrate and to confirm expected pullout values. Notify Engineer immediately if values do not comply.

J. Apply materials within the range of ambient and substrate temperatures recommended by the roofing manufacturer.

K. The Contractor shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Contractor shall report any such blockages in writing to the Engineer for corrective action prior to roof system installation.

L. Do not apply roofing membrane during inclement weather.

1.11 WARRANTY

A. Special Manufacturer's Warranty: Warranty all work under this section in a written document endorsed by the Manufacturer. Manufacturer's warranty must include membrane and accessory products covering defects in workmanship and materials; and all corrective actions necessary to repair damage to the roof membrane and separation board materials caused by roof leaks or improper application with no monetary limitation.
   1. Warranty Period: 20 years from date of Final Completion.
   2. Warranty must include coverage of ponding water areas.

B. Contractor's Labor and Material Guarantee: Correct defective Work at no cost to the Owner.
   1. Warranty Period: Five (5) years from the date of Final Completion.
   2. Warranty: Must cover leaks from failure to resist penetration of water during construction.

PART 2 - PRODUCTS

2.1 GENERAL

A. Only submitted and approved materials shall be utilized.

B. The components of roof system are to be products of one roofing system manufacturer. Components not supplied by the manufacturer shall be approved by the primary system manufacturer for inclusion in the warranty, and be approved by the Engineer.

C. No products used on this project shall contain asbestos.

2.2 PERFORMANCE CRITERIA

A. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

B. Wind Uplift Performance: Provide assembly meeting ASCE 7 requirements for wind uplift.

2.3 MANUFACTURERS

A. In other Part 2 Articles, the following requirements apply to product selection:
   1. Membrane Manufacturer: Subject to compliance with requirements, provide one of the products specified or approved equal.

2.4 THERMOPLASTIC MEMBRANE

A. PVC Sheet: ASTM D 4434, Type II, Grade I, glass fiber reinforced, felt backed.
   1. Subject to compliance with requirements, provide Sarnafil G410; Sarnafil Inc. or approved equal.
   2. Thickness: 60 mils.
   3. Exposed Face Color: White.

B. Membrane Performance Criteria: Criteria for thermoplastic roofing membrane includes, but is not limited to the following:
   1. Solar Reflective Index: 98 minimum.
   2. Solar Reflectance: 0.83 minimum.
   3. Solar Emittance: 0.90 minimum.

2.5 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
   1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Thermoplastic Membrane Flashing: Manufacturer's standard sheet flashing of same material, thickness, and color as PVC sheet membrane. Sheet flashing type to be manufacturer's membrane for adhered installation.
   1. Sarnafil: 60 mil Sarnafil G410; PVC, ASTM D 4434, Type II, Grade I, glass fiber reinforced.
   2. FiberTite: FiberTite-SM; KEE, ASTM D 6754, Type II, Grade I, fabric reinforced.

C. Membrane Clad Metal: Manufacturer's G90 hot dip galvanized steel with manufacturer's thermoplastic membrane laminated on one side.
   1. G90 Galvanized Steel: 24 gauge.
   2. 20 mil unreinforced membrane laminated on one side.
   3. Color: Match membrane roofing.

D. Bonding Adhesive for Horizontal Membrane Securement
   1. Sarnafil: Sarnacol 2121
   2. Fibertite: FTR 190e

E. Bonding Adhesive for Vertical Membrane Securement
   1. Sarnafil: Stabond U-148A
   2. Fibertite: FTR 190e

F. Sealant
   1. Sarnafil: Sikaflex 1a
   2. Fibertite: FTR 101

G. Membrane Cleaner
   1. Sarnafil: Manufacturers approved cleaners – Refer to Sarnafil Roofing Technical Bulletin #02-13 for acceptable products.
   2. Fibertite: Manufacturers approved cleaner – Acetone

H. Termination Bar
   1. Sarnafil: Sarnabar – 14 gauge galvanized steel
   2. Fibertite: FTR T-Bar with Lip

I. Hose Clamp: 100 percent type 316 stainless steel wormgear clamp.

J. Membrane Fasteners and Plates including Fasteners used with Termination Bars
   1. Sarnafil: Sarnafastener – XP and Sarnadisc - XPN
   2. Fibertite: FTR Magnum Fasteners and FTR Magnum-R Stress Plates (round plate)

K. Fasteners for Membrane Clad Metal: Hot-dip galvanized ring shank nails by Maze Nails or equal. Length sufficient to provide minimum 1-1/4-inch embedment or 3/4-inch past underside of sheathing.

L. Pipe/Conduit Supports
   1. Erico Pyramid Caddy Supports
   2. Dura-Blok Roof Top Supports

M. Membrane Walkway Pads
   1. Sarnafil: Sarnatred-V
   2. Fibertite: Tuff-Trac Protection Material

N. Miscellaneous Accessories: Provide other Manufacturer's approved standard roofing system accessories including: pipe/vent flashings, pre-formed inside/outside corners, T-joint covers, aluminum tape, pourable sealers (special condition requires pre-approval from Engineer), etc.

PART 3 - EXECUTION

3.1 GENERAL

A. Install thermoplastic membrane roofing system with positive slope to drains, free of standing (ponding) water.

3.2 SUBSTRATE CONDITION

A. Contractor shall be responsible for acceptance or provision of proper substrate to receive roofing materials.

B. Contractor shall verify that the work done under related sections meets the following conditions:
   1. Roof drains and/or scuppers have been reconditioned and/or replaced and installed properly.
   2. Roof curbs and nailers are properly secured and prepared to receive roofing materials.
   3. All surfaces are smooth and free of dirt, debris and incompatible materials.
   4. All surfaces are free of standing water and visible moisture.

C. All rotted or deteriorated wood shall be removed and replaced. Deck type and attachment shall conform to local code requirements. Fastener heads shall be recessed into the wood surface.

D. Broken, delaminated, wet or damaged insulation or substrate boards shall be removed and replaced.

E. The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease and be structurally sound. Sharp ridges, other projections and accumulations of bitumen above the surface shall be removed to ensure a smooth surface before roofing. Roofing shall not start until all defects have been corrected.

F. Pull-out Tests: Perform pull-out tests to determine appropriate rate and type of fastener installation in presence of manufacturer's technical representative.

3.3 SUBSTRATE PREPARATION

A. The roof deck and roof construction must be structurally sound to provide support for the roofing system. The Contractor shall load materials on the rooftop in such a manner to eliminate risk of deck overload due to concentrated weight.

3.4 ADHERED MEMBRANE ROOFING INSTALLATION

A. Install insulation and substrate board per Section 07 22 00, "Roof and Deck Insulation."

B. Compare Manufacturer's written instructions to those within this Section and to those of Contract Drawings. Notify Engineer immediately with any contradictions. Contractor to proceed with Work only after approval by Engineer.

C. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
   1. Install sheet according to requirements contained within this Section or Manufacturer's requirements if more stringent.
   2. Install membrane roofing free of wrinkles.

D. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to surfaces and at rate required by manufacturer before installing membrane roofing. Do not allow adhesive to skin over or cure prior to installation of membrane. Do not apply to seam area of membrane roofing.

F. In addition to adhering, mechanically fasten membrane roofing securely at base of wall, penetrations, drains, curbs, perimeter of roofing and where indicated.

G. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

H. Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.

I. Install T-joint patches at all 3-way (or greater) membrane overlaps/intersections.

3.5 HOT-AIR WELDING

A. Seam overlaps shall be 3 inches wide when automatic machine welding and 4 inches wide when hand welding.

B. Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.
   1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
   2. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to “flow,” the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1-1/2 inch wide nozzle recommended for use. For corners and compound connections, the 3/4 inch wide nozzle shall be used.

C. Machine welded seams are achieved by the use of Manufacturer’s automatic welding equipment. When using this equipment, Manufacturer’s instructions shall be followed.

D. Correct welds display failure from shearing of the membrane prior to separation of the weld.
   1. Minimum passing weld, machine weld: 1 inch.
   2. Minimum passing weld, hand weld: 3/4 inch.

3.6 QUALITY CONTROL OF WELDED SEAMS

A. The Applicator shall check all welded seams daily for continuity using an approved probing tool. Applicator shall probe all seams and make necessary repairs.

B. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark gray material from the underside of the top membrane.

C. On-site evaluation of welded seams shall be made daily by the Applicator at locations as directed by the Engineer, Owner or manufacturer’s representative.

D. A minimum of one inch wide cross-section samples of welded seams shall be taken at least three times a day. Applicator shall tack weld physical sample over patch and date patch/sample with permanent marker. Applicator will maintain a running catalogue and roof plan with daily test locations identified and tracked.

E. Correct welds display failure from shearing of the membrane prior to separation of the weld.

F. The Engineer may take seam cut test samples randomly during application. The Contractor shall fully cooperate and repair test samples and identified deficiencies promptly at no additional cost to Owner.

3.7 BASE FLASHING INSTALLATION

A. All flashings shall be installed concurrently with the roof membrane as the job progresses. All membrane shall be fully welded each day.

B. No temporary flashings shall be allowed without the prior written approval of the Engineer and manufacturer. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

C. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

D. All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses.

E. Apply bonding adhesive per manufacturer’s instructions. Adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Do not apply to seam area of flashing.

F. Refer to detail drawings for flashing work. Comply with manufacturer requirements if more stringent.

G. Provide enhanced securement of the membrane at the base of parapets, walls, curbs, penetrations, and drains. Refer to detail drawings.

H. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

I. Terminate and seal top of membrane flashings and mechanically anchor to substrate through termination bars fastened at 6 inches on center.
   1. Coordinate flashing with counterflashing/coping installation.

J. Terminate and seal top of penetration flashings with stainless steel wormgear clamp and sealant.
   1. Coordinate flashing with membrane umbrella installation complete with stainless steel Wormgear clamp and sealant.

K. All flashings shall extend a minimum of 8 inches above roofing level. All flashings that exceed 30 inches in height shall receive additional securement. See Contract Drawings for additional securement requirements.

3.8 WALKWAY PAD INSTALLATION

A. Install walkway pads in accordance with manufacturer's written instructions and recommendations. Install where indicated on the Contract Drawings

B. Roofing membrane to receive walkway membrane shall be clean and dry.

C. Place chalk lines on deck sheet to indicate location of walkway.

D. Inspect all existing deck membrane seams that are to be covered by Walkway with probing tool and re-weld any inconsistencies before Walkway installation.
   1. Area to receive walkway protection membrane shall be reviewed and approved by the Engineer and manufacturer prior to the installation of the walkway pad.

E. Clean the deck membrane in areas to be welded.

F. Provide 2-inch gap between walkway sections and between walkway and roof mounted items.

G. Fully weld perimeter walkway.

3.9 MISCELLANEOUS MATERIALS

A. Pipe/Conduit Supports: Install pipe supports where indicated and where necessary to support piping. Secure piping to pipe support in accordance with manufacturer's written instructions and recommendations.

B. Aluminum Tape: Install aluminum tape as a means of separating membrane from contaminated material, bituminous coated cast iron pipes, and any other materials incompatible with membrane.

3.10 TEMPORARY CUT-OFF

A. All temporary waterstops shall be constructed to provide a 100 percent watertight seal.

B. The waterstop shall be sealed to the (e) roofing that water will not be allowed to travel under the new or existing roofing.

C. If inclement weather occurs while a temporary waterstop is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.

D. The edge of the membrane shall be sealed in a continuous heavy application of manufacturer approved sealant.

E. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers and other components of waterstop shall be removed from the work area and properly disposed of off-site. None of these materials shall be used in the new work.

F. If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

3.11 CLEANING

A. Remove and dispose of roofing debris on a daily basis. Protect all newly installed roof surfaces.

B. Clean all contaminants generated by roofing work from building and surrounding areas, including, but not limited to, adhesives, sealants and coatings.

C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

D. Repair or replace components of roofing system and finished surfaces damaged or defaced due to the Work of this Project; comply with recommendations of manufacturers of components and surfaces.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional Work with specified requirements.

F. Prior to final inspection, Contractor shall clean the roof membrane to permit inspection of all seams. Cleaning shall remove all surface containments.

G. Contractor is responsible for the cleaning and removal of all debris or residue that is tracked from existing roof areas to the installed thermoplastic membrane.

3.12 CLOSEOUT ACTIVITIES

A. Final Roof Membrane Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Engineer.
   1. Notify Engineer and Owner 48 hours in advance of date and time of inspection.
   2. Substantial Completion: A “no-defect” final roof membrane inspection report is required prior to the Contractor requesting the Substantial Completion review.

3.13 PROTECTION

A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

B. All landscaped areas and adjacent construction damaged by construction activities shall be repaired at no cost to the Owner.

3.14 FIELD QUALITY CONTROL

A. Testing Agency: Owner shall engage a qualified third party testing agency to perform tests and inspections.

B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

END OF SECTION

SECTION 076200

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Shop and field formed flashing, reglets, scuppers, gutters and downspouts.

B. Related Sections:
1. Section 072736 – Air Barriers: Flexible flashing and through-wall flashing.
2. Section 075400 – Single Ply PVC Roofing.
3. Section 077000 – Roof Accessories: Manufactured Copings.

C. This Project is a registered US Green Building Council “LEED” project.
1. Select materials to maximize use of recycled steel.
2. Select locally or regionally fabricated products wherever possible.

1.2 REFERENCES

A. Reference Standards: Comply with applicable provisions for design, materials, fabrication, and installation of component parts of Sheet Metal and Air Conditioning Contractors National Association (SMACNA), 6th Edition.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
1. Submit product data for prefinished galvanized steel.
2. Submit product data indicating performance and physical characteristics of sheet metal products, including thickness.
3. Submit color charts for finish indicating manufacturer's colors available for selection.

C. Shop Drawings:
1. Indicate typical layout including dimensions, configuration, locations, interface with adjacent systems, clearances, tolerances, frequency of attachment, and fabrication details.
2. Submit detail drawings of transitions, intersections, and connections.

D. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
2. Qualification Data: Fabricator's qualification data.

E. Closeout Submittals:
1. Warranty: Submit specified product warranty in accordance with Section 017800.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
   a. Steel.
   b. Aluminum.
2. LEED Credit MRc4: Provide documentation certifying the percentage of recycled content of metal materials based on material cost per weight for the following materials:
   a. Steel.
   b. Aluminum.
3. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
   a. Steel.
   b. Aluminum.

1.4 QUALITY ASSURANCE

A. Fabricator’s Qualifications: Company specializing in sheet metal flashing work with 3 years documented experience in similar size and type of installations.

B. Certifications: Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

B. Stack pre-formed material to prevent twisting, bending, and abrasions, and to provide ventilation.

C. Prevent contact with materials which may cause discoloration or staining.

1.6 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Warrant installed system to be free of leaks and free from defects in materials and workmanship for 2 years from date of Substantial Completion of project.

C. Warrant factory applied fluorocarbon finish to be free of cracks, splits, crazing, chipping, peeling, and color fading for 10 years from date of Substantial Completion of Project.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Steel Sheet:
   1. General: Zinc coating, hot dip galvanized, flattened sheets, chemically treated.
   2. Commercial Quality: ASTM A653, G90
   3. Lock-Forming Quality: ASTM A653, G90
   4. Thickness: As recommended in Architectural Sheet Metal Manual for intended purposes.
   5. Finish: Mill phosphatized where indicated for painting.

2.2 ACCESSORIES

A. Reglets:
   1. General:
      a. Units of type and profile as indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces.
      b. Compatible with flashing and roofing materials.
   2. Surface-Mounted:
      a. Manufactured surface applied reglet with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
      b. Acceptable Product: Equivalent to Type SM, Fry Reglet Corporation.
   3. Cement Plaster:
      a. Manufactured for use in cement plaster applications with upstanding leg concealed behind plaster and projection to act as screed for direct application of plaster.
      b. Acceptable Product: Equivalent to Type STX or Type ST Stucco Reglet (depending on substrate conditions), Fry Reglet Corporation.
   4. Concrete:
      a. Manufactured channel with temporary closure tape to keep reglet free of concrete materials, fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
      b. Acceptable Product: Equivalent to Type CO, Fry Reglet Corporation.
   5. Masonry:
      a. Manufactured reglet with offset top flange for embedment in masonry mortar joint.
      b. Acceptable Product: Equivalent to Type MA, Fry Reglet Corporation.
   6. Manufacturers:
      a. Fry Reglet Corporation.
      b. W. P. Hickman Company.
      c. Keystone Flashing Company.

B. Fasteners:
   1. Materials: Copper or brass for fastening copper, lead coated copper, and terne coated steel; AISI Series 300 for stainless and galvanized steel; aluminum for aluminum sheets.
   2. Nails: Use annular ring shank type, No. 12 gage or larger to suit application, of sufficient length to penetrate backing material at least 7/8 inch.
   3. Screws and Bolts: Sufficient size and length to sustain imposed stresses.

C. Solder Materials:
   1. Flux: Type as recommended by sheet material manufacturer; not detrimental to base material.
   2. Solder: ASTM B32, 50 percent tin/50 percent lead for plain copper, galvanized steel.

D. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, containing no asbestos fibers, compounded for 15 mil dry film thickness per coat.

E. Butyl Tape Sealant:
   1. Comply with ASTM C 1281:
   2. Preformed, butyl-based elastomeric tape sealant with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces.
   3. With or without spacer rod as recommended in writing by tape manufacturers for application indicated.
   4. Packaged on rolls with a release paper backing.

F. Sealants:
   1. Silicone—General Purpose sealant specified in Section 079200.
   2. Color as selected by Architect from full range of manufacturer's standard colors.

G. Gutter Screen: 1/4 inch hardware cloth installed in sheet metal frames. Fabricate screen and frame of same basic material as gutters and downspouts.

H. Prefabricated Concrete Splash Block: Manufacturer's standard precast concrete.

2.3 FABRICATION

A. General:
   1. Shop fabricate components to maximum extent possible to minimize site fabrication.
   2. Fabricate to allow for adjustments in field for proper anchoring and joining.
   3. Form sections true to shape, accurate in size, square, free from distortion and defects.
   4. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.
   5. Fabricate corners from one piece with minimum 18 inch long legs; solder for rigidity; seal with sealant.
   6. Solder
      a. Solder and seal metal joints except those indicated or required to be expansive type joints.
      b. After soldering, remove flux. Wipe and wash solder joints clean.

B. Seams:
   1. Provide following seam types unless noted or detailed otherwise.
   2. Flat: Drive cleat.
   3. Corner: Double corner.
   4. Standing: Double lock standing.

C. Sheet Metal Thickness/Mass:
   1. Gutters: In accordance with SMACNA Table 1-5.
   2. Downspouts: In accordance with SMACNA Table 1-9.

D. Through Wall Scupper: As indicated on Drawings and in accordance with SMACNA Figures 1-26, 1-27 and 1-30.
   1. Fabricate scuppers of dimensions required with closure flange trim to exterior, 4 inches wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.
   2. Fasten gravel guard angles to base of scupper.

E. Conductor Head: As indicated on Drawings and in accordance with SMACNA 1-25F.

F. Gutter:
1. As indicated on Drawings and in accordance with SMACNA Figure 1-2B.
2. Fabricate front edge 1 inch lower than back.
3. 5 inches wide by 4 inches high, unless detailed otherwise.
4. Gutter hangers: SMACNA Figure 1-19A.
5. Gutter screens: SMACNA Figure 1-24.

G. Downspout:
1. As indicated on Drawings and in accordance with SMACNA Figure 1-32B.
2. Size: 3 inch by 5 inch.
3. Hangers: SMACNA Figure 1-35B.

2.4 FINISHES

A. Fluorocarbon Coating:
1. Comply with AAMA 2605.
2. Resin: 70 percent polyvinylidene fluoride (PVDF).
3. Substrate: Cleaned and pre-treated.
4. Primer:
   a. Coating: Manufacturer's standard resin based compatible coating.
   b. Dry Film Thickness: Minimum 0.80 mil.
5. Topcoat:
   a. Coating: PVDF.
   b. Dry Film Thickness:
      1) Coil: 0.80 mil.
      2) Extrusion: 1.0 mil
6. Color: Manufacturer's standard colors as selected by Architect.
7. Acceptable Coatings Manufacturers:
   a. Akzo Nobel Coatings, Inc.
   b. Lilly Industries, Inc.
   c. Morton International, Inc.
   d. PPG Architectural Finishes, Inc.
   e. Valspar Corporation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

C. Verify membrane termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Field measure site conditions prior to fabricating work.

B. Install edge strips and cleats before starting installation.

C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

3.3 INSTALLATION

A. General:
1. Install metal work in accordance with SMACNA.
2. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
3. Apply asphalt mastic on metal surfaces of units in contact with cementitious materials and dissimilar metals.
4. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
5. Miter, lap seam and close corner joints with solder. Seal seams and joints watertight.

6. Install expansion joints at frequency recommended by SMACNA. Do not fasten seams such that movement is restricted.
7. Coordinate with installation of roofing system and roof accessories.

B. Flashing
1. Insert flashings into reglets to form tight fit. Secure in place with wedges at maximum 12 inches on center. Seal flashings into reglets with sealant.
2. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.

C. Counterflashing and Reglets:
1. Fabricate counterflashings and reglets as 2 piece assemblies to permit installation of counterflashing after base flashings are in place.
2. Fabricate reglets of same metal and gage as counterflashings.
3. Install continuous preformed butyl sealant tape behind fastener line of surface mounted reglets in accordance with manufacturer's written instructions. Apply silicone weather seal at top edge. Prevent contact between different sealing materials.
4. Overlap composition base flashing 4 inches minimum.
5. Install bottom edge tight against base flashing.
6. Lap seam vertical joints 3 inches minimum and apply sealant.

D. Gutters and Downspouts:
1. Flash and seal gutter to downspout.
2. Slope gutters not less than 1/8 inch per foot.
3. Provide expansion joints at 50’-0" maximum.
4. Hang gutter with sheet metal straps spaced 3’-0" centers.
5. Provide prefabricated concrete splash blocks for each downspout terminating at ground levels.

3.4 CLEANING

A. Upon completion of each area of soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with washing soda solution, and then flushing clear water rinse. Use special care to neutralize and clean crevices.

END OF SECTION

SECTION 077000

ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Roof Curbs and Supports.
   2. Pipe Portals.
   3. Preformed Copings
   4. Roof Hatch.

B. Related Sections:
   1. Section 072736 – Air Barriers.
   2. Section 0754000 – Single Ply PVC Roofing.
   3. Section 076200 – Flashing and Sheet Metal: Counterflashing.

1.2 SYSTEM DESCRIPTION

A. Curbs, Equipment Supports, Pipe Roller Supports, and Pipe Portals:
   1. Design Requirements: Manufacturer is responsible for designing units, including anchorage to structural system and necessary modifications to meet specified requirements.
   2. Structural Requirements: Design to support load of curb-mounted equipment.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit manufacturer’s descriptive literature and product specifications for each product.
   2. Indicate profiles, anchorages, jointing details, flashings, and accessories.
   3. Include color charts for finish indicating manufacturer’s standard colors available for selection.

C. Shop Drawings:
   1. Indicate typical layout including dimensions, configuration, locations, interface with adjacent systems, clearances, tolerances, frequency of attachment, and fabrication details.
   2. Submit detail drawings of transitions, intersections, and connections.
   3. Submit detail drawings of accessory components not included in manufacturer’s product data.

D. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Manufacturer's instructions.

E. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Warranty: Submit specified warranty in accordance with Section 017800.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish each product from one manufacturer, unless otherwise acceptable to Architect.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.

C. Roof Curb Installer Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.

D. Certifications:
   1. Submit manufacturer’s certification that products furnished for Project meet or exceed specified requirements.
   2. Submit Contractor’s and installer’s certification that products are installed in accordance with Contract Documents.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Stack materials to prevent twisting, bending and abrasions, and to provide ventilation.

1.6 WARRANTY

A. Comply with provisions of Section 017800.

B. Warrant installed roof curbs and copings to be free from defects in material and workmanship for time period to match roof system specified in Section 075400.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Quality Galvanized Steel: ASTM A653, with galvanized G90 coating.

B. Aluminum Extrusions: ASTM B221, alloy and tempered as required by manufactured for intended use but not less than strength and durability qualities of alloy 5005-H15.

C. Aluminum Sheet: ASTM B209, alloy and tempered as required by manufactured for intended use but not less than strength and durability qualities of alloy 6063-T5.

D. Preservative Pressure Treated Wood: Softwood lumber treated in accordance with AWPA C2 for above grade use.

E. Bituminous Paint: SSPC Paint 12

F. Roofing Cement: ASTM D4586, Type I.

2.2 TRIM

A. Preformed Coping:
   1. Acceptable Products and Manufacturers:
      a. Permasnap Coping, W. P. Hickman Company.
      b. Snap-Lock Coping, Style SLC, MM Systems Corporation.
      c. Perma-Tite Coping, Metal-Era, Inc.
   2. Description:
      a. Anchor Plate/Cleat: 20 gage thick commercial quality galvanized steel or manufacturer's standard aluminum.
      b. Coping: 0.050 inch thick aluminum, smooth surface.
      c. Gutter/Splice Plate: Anchor cleat with integral drainable gutter or manufacturer's standard closed cell composition compressible material gasket between anchor plate and coping finish top match coping.
      d. FM 1-90 wind uplift rating.
      e. Slope coping towards roof.
      f. Provide gutter/splice plates at joints between sections of coping.
   3. Finish: 70% PVDF Kynar coating, in custom color to be determined.

B. Fabrication:
   1. Form sections true to shape, accurate in size, square, free from distortion and defects, to profiles indicated.
   2. Shop fabricate intersections, inside corners, and outside corners with miters welded in factory prior to finishing.
   3. Shop fabricate radius curved corners.

C. Accessories: Provide fasteners, clamping devices, splice strips adhesives, and sealants required by system for proper performance and as recommended by manufacturer.

D. Parapet Cap Membrane: Self-adhering rubberized asphalt tape.
   1. Locations: Over parapets and under coping caps.
   2. Capable of being applied at temperature of 25 degrees F.
   3. Provide high temperature type for used under metal copings.
   4. Thickness: 30 mils minimum.
   5. Permeance: 0.1 perms.
   6. Puncture Resistance: ASTM E514, 40 pounds-force, minimum.

7. Tensile Strength of Membrane: ASTM D412, 600 PSI, minimum.
8. Pliability: 180 degree bend over 1 inch at 25 degrees F.
9. Primer: Manufacturer's required surface primer.
10. Acceptable Products and Manufacturers:
    a. Blueskin PE 200 HT, Henry.
    b. Ice and Water Shield HT, Grace Construction Products.
    c. CCW MiraDRI WIP 300 High Temperature, Carlisle Coatings and Waterproofing.

2.3 CURBS AND SUPPORTS

A. Acceptable Roof Curb Products and Manufacturers:
1. Model RPC-1 by Roof Products, Inc.
2. Style PC-5 by The Pate Company.
3. Model RC-4A by Roof Products and Systems Corporation.
4. Model TC-1 by ThyCurb.

B. Acceptable Equipment Support Rail Products and Manufacturers:
1. Model RPES-1 by Roof Products, Inc
2. Style ES-5, The Pate Company.
3. Model ER-4A, Roof Products and Systems Corporation.
4. Model TEMS-1, ThyCurb.

C. General:
1. Sheet Metal: Structural quality galvanized steel, thickness to suit spans and imposed loads with corner seams mitered and welded.
2. Insulation: 3 pcf density, rigid glass fiber board, minimum 1-1/2 inches thick.
3. Wood Nailers and Grounds: Preservative pressure treated wood, minimum 2 inch cross sectional dimensions.
4. Height: 8 inches minimum above elevation of finished roofing, except where indicated otherwise.
5. Built-in Cant: 3 inch wide; 45 degree angle.
6. Fabricate with bottom edge of built-in cant raised above roof deck surface to accommodate roof deck insulation.
7. Curbs:
    a. Size: Accommodate curb-mounted equipment and pipe portals; coordinate requirements prior to fabrication.
    b. Liners: Provide sheet metal liners on inside of unit.
8. Pipe Rollers Supports:
    a. Provide with single channel atop curb to support threaded rods holding pipe rollers.
    b. Size pipe rollers to accommodate pipe sizes.

2.4 PIPE PORTALS

A. Pipe Portals for Low-Sloped Roofs:
1. Manufacturer’s standard ABS and EPDM rubber boots to accommodate 3/8 through 6 inch diameter pipe.
2. Furnish complete with stainless steel hose clamps.
3. Accommodate quantity and size of piping to pass through portal caps.
4. Fabricate for mounting atop manufacturer’s curb.
5. Acceptable Products and Manufacturers:
    a. RPVP-3 Vertical Pipe Curb and Cover, Roof Products, Inc.
    b. PCA-5, Pipe Curb Assembly, The Pate Company.
    c. Pipe Portal System, Roof Products and Systems Corporation.
    d. TP-2 Piping Cover, ThyCurb.

2.5 HATCHES

A. Acceptable Hatch Manufacturers:
1. Babcock-Davis Hatchways, Inc.
2. Bilco Company.
3. Dur-Red Products.

4. Milcor, Inc.

B. Description:
1. Access Hatch, Single Leaf, Nominal Size: Size as indicated on Drawings.
2. Structural quality galvanized steel or aluminum construction acceptable, except units 7'-0" or larger require covers of aluminum construction.
3. Structural quality galvanized steel:
a. Curb: 14 gage minimum thickness.
b. Cover: 22 gage minimum thickness.
4. Aluminum:
a. Curb and cover: 0.090 inch minimum thickness.
b. Liner: 0.063 inch minimum thickness.
5. Liner Insulation: 1 inch thick glass fiber, expanded polystyrene, or expanded polyurethane.
6. Curb Insulation: 1 inch fiber board.
7. Access Hatch Hardware: Manufacturer's standard hinges, compression spring operators, positive snap latch with turn handles inside and out, padlock hasp inside, automatic hold-open device with vinyl covered grip handle, and neoprene draft seal.
8. Curb:
a. 12 inch high minimum with 3-1/2 inch flange equipped with clearances holes for securing to deck.
b. Equip with integral metal cap flashing, same gage as curb.
c. Fully cover and protect cover insulation with metal liner.
d. Fabricate with top of curb level and bottom to accommodate roof slope.
9. Construct cover with 3 inch beaded flange, welded.
10. Fabrication:
a. Fabricate free of visual distortions and defects.
b. Weld corners and joints.
c. Provide for removal of condensation occurring within components or assembly.
d. Fit components for weathertight assembly.
11. Finishes:
a. Aluminum: Manufacturer's standard acrylic lacquered protective coating over mill finish.
b. Steel: Manufacturer's standard shop applied prime coat.
1) Field paint under Section 099000 Painting and Coating.
c. Hardware: Stainless steel.
12. Signage: Provide permanent signage with minimum 1 inch high letters at top surface and underside surface of hatch covers to read: KEEP HATCH CLOSED WHEN NOT IN USE. Comply with CABO/ANSI A117.1 requirements.

C. Safety Rail:
1. Provide manufacturer's OSHA compliant (CFR 1910.23) fall protection safety rail system that surrounds hatch and is connected directly to hatch. Do not compromise hatch operation or weathertight integrity.
2. No attachment to roof is allowed.
3. Meet railing safety requirements of authorities having jurisdiction.
4. Fabricate posts and railing from hot-dipped galvanized steel or fiber reinforced polymer.

D. Safety Post:
1. Provide telescoping tubular safety post fabricated from hot-dipped galvanized steel.
2. Acceptable product: Bilco LadderUP Safety Post Model LU-2.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that deck, curbs, blocking, cants, roof membrane, and base flashing are in place and positioned correctly.

C. Coping:
   1. Verify that coverage onto vertical finish materials is sufficient to result in watertight installation.
   2. Verify membrane terminations and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Parapet Cap Membrane:
   1. Clean substrate of dirt, dust, and materials which may impair adhesion.
   2. Apply primer, when required, in accordance with manufacturer's requirements.
   3. Apply to top of parapet wall under coping and gravel stops.
   4. Turn membrane down exterior wall face and parapet wall face 2 inches.
   5. Install without fishmouths and wrinkles.
   6. Press tape into firm contact with substrate.
   7. Lap tape ends minimum of 1 inches.

3.3 INSTALLATION

A. General:
   1. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
   2. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.
   3. Securely anchor roof accessories to supporting substrates with appropriate type fasteners.
   4. Coordinate with installation of roofing system and related flashings.

B. Coping: Secure in place with concealed fasteners using methods as recommended by manufacturer to comply with FM rating. Seal joints watertight.

C. Curbs: Integrate curbs with adjacent roofing systems, base flashings, and counter flashings to create watertight conditions.

D. Hatches: Secure flanges to deck by bolting or welding.

3.4 ADJUSTING AND CLEANING

A. Adjust hatch covers and hardware for smooth, uniform operation.

B. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.

C. Clean primer, adhesive, flashing cements, and other products from surfaces, exposed sheet metal and bellows.

3.5 PROTECTION

A. Protect finished work in accordance with Section 017300.

END OF SECTION

SECTION 078100

APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 078400 - Firestopping

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled materials.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM DESCRIPTION

A. Beams are unrestrained for purposes of UL Fire Resistance Directory designs.

1.3 SUBMITTALS

A. General: Submit following items in accordance with Section 013300.

B. Product Data: Submit product data for each product indicating physical characteristics and test performance.

C. Submit following Informational Submittals:
   1. Design Data:
      a. Indicate UL or other nationally recognized independent testing agency test assembly number.
      b. Submit description of areas and elements to receive fireproofing for each fire resistance rating.
   2. Submit column and beam sizes and fireproofing thicknesses in a schedule with associated UL assembly numbers.
   3. Test Reports:
      a. Submit certified test results from independent testing laboratory attesting compliance of sprayed fireproofing products with performance requirements indicated in Field Quality Control article.
   4. Submit certifications specified in Quality Assurance article.
   5. Qualification Data: Applicator’s qualification data.
   6. Manufacturer's instructions.

D. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Warranty: Submit specified warranty.

E. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
      a. Fireproofing.
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Fireproofing.
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Fireproofing.
   4. LEED Credit EQc4.2: Provide VOC Emissions Data and chemical component limits for the following materials:
      a. Fireproofing, primers, and sealers.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Furnish products from one manufacturer for entire Project, unless otherwise acceptable to Architect.
   2. Provide fireproofing as complete system, including wire fabric, lath, hangers, and accessory items necessary for proper function.
   3. Applicator Qualifications:
   4. Company specializing in application of specified sprayed fireproofing.
   5. Minimum 3 years documented experience.
   6. Provide list of projects having similar scope of work, identify by name, location, date, reference name and phone number.
   7. Licensed or approved by manufacturer of fireproofing materials.

B. Regulatory Requirements: Comply with UL or other nationally recognized independent testing agency test for design and construction of fire resistance system.

C. Certifications:
   1. Submit Manufacturer's Certification:
      a. Fireproofing materials are non-combustible, non-corrosive, and asbestos-free.
      b. Fireproofing materials furnished for Project meet or exceed specified requirements.
      c. Fireproofing materials are compatible and performance will not be impaired by steel primers.
      d. Fireproofing schedule meeting requirements of UL and authority having jurisdiction.
   2. Submit Contractor's and applicator's certification that products are installed in accordance with Contract Documents.
   3. Submit certificate of compliance from authority having jurisdiction indicating approval of fireproofing materials and proposed thicknesses.

1.5 FIELD SAMPLES

A. Comply with requirements of Section 014500.

B. Provide samples of approximately 100 square feet on erected job site members at locations selected by Architect.

C. Comply with project requirements regarding thickness, density of application, fire rating, and finish texture.

D. Examination:
   1. Examine installation within one hour after completion.
   2. Where shrinkage and cracking are evident: Remove fireproofing, adjust mixture and method of application, and reapply fireproofing.

1.6 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

1.7 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

B. Packing, Shipping, Handling, and Unloading: Deliver materials in manufacturer's unopened containers with manufacturers name, product identification, lot number, and mixing and installation instructions.

C. Storage and Protection: Store materials to prevent deterioration and damage due to moisture, temperature change, and contamination by harmful materials.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not apply spray fireproofing when temperature of substrate and surrounding air is below 40 degrees F.

B. Ventilation:
   1. Provide ventilation in areas to receive fireproofing during application and until applied materials are thoroughly dry.

2. Provide ventilation in areas lacking natural ventilation.

1.9 SEQUENCING

A. Coordinate installation to avoid damage to sprayed fireproofing by subsequent trades and harmful environmental conditions.

B. Do not apply fireproofing to metal roof decking substrates until roofing has been completed. Prohibit roof traffic during application and drying of fireproofing.

C. Do not apply fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.

D. Defer installing ducts, equipment, piping, and other items that would obstruct with application of fireproofing.

E. Do not install enclosing and concealing construction until after:
1. Fireproofing has been inspected and tested.
2. Corrections have been made to fireproofing.

1.10 WARRANTY

A. Comply with provisions of Section 017800

B. Warrant installed fireproofing to be free from defects in material and workmanship for 2 years.

C. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.

D. Include coverage for replacement and repair of failures.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Cementitious Products and Manufacturers:
1. Pyrolite 15, Carboline Company.
2. Monokote MK-6/HY, Grace Construction Products.
3. Cafco 300, Isolatek International.

2.2 MATERIALS

A. Sprayed Fireproofing:
1. Factory formulated mixture of asbestos-free cementitious materials with aggregates [or mineral fibers with inorganic binders].
   a. Density: ASTM E605, 15 pcf minimum.
   b. Deflection: ASTM E759, no cracks, spalling, and delamination from surface to which fireproofing is applied.
   c. Bond Impact: ASTM E760, no cracks, spalling, and delamination from surface to which fireproofing is applied.
   d. Adhesion: ASTM E736, 200 psf minimum.
   e. Air Erosion: ASTM E859, 0.000 gm/square foot maximum.
   f. Compressive Strength: ASTM E761, 1,200 psf minimum.
   g. Corrosion of Steel: ASTM E937, no evidence of corrosion.
   h. Surface Burning Characteristics: ASTM E84, flame spread of 0, smoke development of 0.

B. Water: Clean, fresh, suitable for domestic consumption.

C. Bonding Primer/Adhesive: Non-combustible type required by fireproofing manufacturer.

D. Adhesive and Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
1. Current requirement refers to the date on which the materials are installed in the building.
2. Use primers, sealers and undercoaters with VOC limits of less than 100 g/L to comply with Cal GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

2.3 ACCESSORIES

A. Metal Lath:
   1. Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistive designs indicated and fireproofing manufacturer's recommendations.
   2. Include clips, lathing accessories, and other anchorage devices required to attach lath to substrates and to receive fireproofing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

3.2 PREPARATION

A. Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting.

B. Close off and seal adjacent duct work.

C. Clean substrate of dirt, dust, grease, oil, mill scale, loose rust and paint, frost, and other matter which could adversely affect bond of sprayed fireproofing to substrate.

D. Remove incompatible materials which would adversely affect bond.

E. Provide temporary enclosures to prevent deterioration of fireproofing for interior applications exposed to detrimental environmental conditions.

3.3 APPLICATION

A. Apply bonding primer/adhesive to surfaces where required by fire-resistance rating and manufacturer.

B. Metal Lath:
   1. Install metal lath to comply with fire-resistance ratings and recommendations of fireproofing manufacturer for conditions of exposure and intended use.
   2. Securely attach lath to substrate in position required for support and reinforcement of fireproofing.
   3. Use anchorage devices of type recommended by fireproofing manufacturer.

C. Mix and apply materials in accordance with manufacturer's instructions.

D. Apply sprayed fireproofing in sufficient thickness to achieve rating with as many passes as necessary. Cover substrate in a monolithic blanket of uniform density and texture.

E. Exercise care to spray material completely into inverted corners and to build fireproofing to full thickness at projecting corners.

3.4 FIELD QUALITY CONTROL

A. Site Tests and Inspections: Comply with requirements of Section 014500.

B. Owner will employ and pay for services of an independent testing laboratory to perform field quality control testing.

C. Tests:
   1. Perform thickness and density tests on installed fireproofing in accordance with ASTM E605.
   2. Provide Thickness Tests as follows:
      a. 25 percent of primary beams and columns.
      b. 10 percent of secondary beams and columns.
      c. 10 locations of deck for each 10,000 square feet of floor area or portion thereof.
   3. Provide 1 density test for each 10,000 square feet of floor area or portion thereof, but not less than two per floor.
   4. Provide 1 bond strength test in accordance with ASTM E736 for each 10,000 square feet of floor area or portion thereof, but not less than two per floor.

3.5 ADJUSTING

A. Repair and replace fireproofing within areas where test results indicate fireproofing does not comply with requirements.

B. Patch damage to fireproofing caused by other trades before final inspection of this work and prior to enclosure by other building components.

C. Patch areas where average thickness of material is less than minimum required by indicated design, and locations where individual thickness is deficient by more than [(1/4 inch)] or 25 percent of required thickness, whichever is less.

D. Patch areas where inspection cuts and tests have been made.

3.6 CLEANING

A. Upon completion of spraying operations in each containable area of Project:
   1. Remove overspray and fallout of materials from adjacent surfaces.
   2. Clean exposed surfaces to remove evidence of soiling.

3.7 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect fireproofing from damage resulting from subsequent construction operations and other causes so that fireproofing will be without damage and deterioration at date of Substantial Completion.

C. Repair and replace work which has not been successfully protected.

END OF SECTION

SECTION 078400

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Firestop devices and systems tested in accordance with ASTM E814 (ANSI/UL 1479) and listed in UL Fire Resistance Directory.
   2. Fire resistant construction joints.
   3. Dynamic partition head details.
   4. Edge of slab and curtain wall conditions.
   5. Penetrations through fire-rated floors, walls, and shafts.
   6. Duct and damper firestops.
   7. Intumescent wraps and pads at receptacle boxes and recessed items within fire rated walls.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select adhesives and sealants meeting LEED requirements.
   2. Select materials to maximize use of recycled materials.
   3. Select locally or regionally fabricated products wherever possible.

C. Select adhesives, primers and sealants meeting Cal-GREEN requirements.

D. Related Sections:
   1. Section 017329 - Cutting and Patching; Repair of openings with original materials.
   2. Section 092900 - Gypsum Board
   3. Division 21 – Fire Suppression.
   4. Division 22 – Plumbing.
   5. Division 23 – Heating, Ventilating, and Air Conditioning.
   6. Division 26 – Electrical.

1.2 SYSTEM DESCRIPTION

A. General: Make firestop and smoke seal assembly selections that comply with UL Fire Resistance Directory, authority having jurisdiction, and applicable codes for:
   1. Materials, fabrication, and installation of firestops and smoke seals.
   2. Fire containment.
   3. Fire resistant construction joints.
   4. Dynamic partition head details.
   5. Edge of slab and curtain wall conditions.
   6. Penetrations through fire-rated floors, walls, and shafts.
   7. Duct and damper firestops.
   8. Intumescent wraps and pads at receptacle boxes and recessed items within fire rated walls.
   9. Coordinate with mechanical and electrical to provide single manufacturer for all firestopping materials.

B. Firestop Voids and Openings in Following Locations:
   1. Duct, cable, cable tray, conduit, piping, and other penetrations through floor slabs (except on-grade slabs) and through fire rated walls and partitions.
   2. Penetrations of vertical shafts, pipe chases, elevator shafts, and utility shafts.
   3. Openings between floor slab edges and exterior walls, including glass and aluminum curtain walls.
   4. Openings, gaps, and cracks at abutting fire rated assemblies and components, such as wall-to-wall and wall-to-floor including overhead floor and roof decks.
   5. Blank openings into or through fire rated floors and walls.
   6. Other locations indicated or scheduled.

C. Design Requirements:
   1. Firestop materials used to fill floor openings in which smallest dimension is 4 inches shall support same loads that floor was designed to support. If equal floor loading capacity cannot be obtained with firestop material, provide fire rated permanent covering to support loads and traffic, capable of being removed to allow access.
   2. Insulated Piping and Duct Penetrations: Install firestop systems intended for use with type of insulation on penetrating item.
      a. Install firestop systems intended for use with type of insulation on penetrating item.
      b. If compatible firestop system is unavailable, remove insulation at contact area with firestop material
      c. Coordinate with trades who installed insulation to ensure proper re-sealing of cut edges of insulation.
   3. Provide Products that Do Not Deteriorate when Exposed to Following Conditions:
      a. Plumbing and Wet-Pipe Sprinkler Systems: Moisture-resistant through-penetration firestop.
      b. Exposed to View:
         1) Flame-spread value of less than 25 and smoke-developed value of less than 450, ASTM E84.
         2) Compatible with applied finishes.

D. F and T Rating Requirements: Conform to F and T ratings, ASTM E 814 (ANSI/UL 1479).
   1. Comply with applicable codes and authority having jurisdiction.
   2. F Ratings: Equal to fire resistance rating of assembly being penetrated but not less than one hour.
   3. T Ratings: Equal to F ratings or as required by authority having jurisdiction.

E. Testing Requirements:
   1. Utilize systems and materials tested and approved by UL or other nationally recognized independent testing agency acceptable to authorities having jurisdiction.
   2. Determine fire ratings in accordance with ASTM E814 (ANSI/UL 1479) for through penetration firestops, ASTM E119 (UL263) for fire rated assemblies, and as required by applicable codes and authority having jurisdiction.

F. Large openings may be closed with same type construction as adjacent floor, roof, and wall assembly.

G. Sealing around penetrations fire rated assemblies without approved firestop system is not permitted. Methods and materials not permitted include but are not limited to:
   1. Joint compound at gypsum board assemblies.
   2. Mortar at masonry and concrete assemblies.
   3. Use of joint sealants.

H. Whenever finished firestop materials are scheduled to receive finish paint or other coatings, test compatibility of firestop materials with coatings to be applied.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Submit deferred submittal to authorities having jurisdiction for each firestopping system and condition for this project. Obtain approval from authority having jurisdiction.

C. Provide manufacturer's certification stating:
   1. Each penetration of fire rated walls and floor, partition heads, and edge of slabs will be firestopped with a firestopping system tested by UL or other recognized testing agency for substrate and penetrating item.
   2. Authorities having jurisdiction have approved firestopping systems for this project.
   3. Products and Classifications Schedule:
      a. Provide tabular form schedule for firestops, fire containment, and fire resistant construction joints.
      b. Schedule to identify:
         1) Construction penetrated including fire resistance rating.
         2) Penetrating item.

3) Products and manufacturers included in each system.
4) Form material used.
5) Firestop classification and description from UL or other nationally recognized independent testing agency acceptable to authority having jurisdiction.
6) Fire containment and fire resistant construction joint description.
7) F and T ratings.

c. Update schedule periodically to include addition and changes.

D. Informational Submittals: Submit following:
1. Test Reports: Copy of UL or other acceptable testing agency report illustrating each system and device as tested and approved.
2. List of generic descriptions and product names and manufacturers included in each system including form material, containment system, gang assemblies, means of controlling size of annular space, and sealer, topcoat, or intumescent materials.
3. Certifications specified in this section.
4. Qualification Data: Manufacturer's and installer's qualification data.
5. Manufacturer's field reports.

E. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
a. Firestopping.
2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
a. Firestopping.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
a. Firestopping.
4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
a. Adhesives and sealants.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years experience.

B. Installer Qualifications:
1. Company specializing in installation of firestopping specified with experience on at least five projects of similar nature in past three years.
2. Licensed, trained, and approved by manufacturer of firestop materials.
3. Engage experienced installer who is certified, licensed, FM Approved in accordance with FM 4991, Certified by UL as a Qualified Contractor, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements.

C. Installer Responsibility: Select firestop, fire containment, and fire resistant construction joint products from those indicated for each penetration.
1. Obtain approval of authorities having jurisdiction for selected methods.
2. Submit proposed methods along with proof of acceptance by authority having jurisdiction.

D. Regulatory Requirements: Ensure firestop, fire containment, and construction joint components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.

E. Certifications:
1. Manufacturer's certification that products furnished for Project meet or exceed specified requirements.

2. Contractor's and installer's certification that products are installed in accordance with Contract Documents, based on inspection and testing specified as part of Field Quality Control.
3. Certificates of compliance from authority having jurisdiction indicating approval of firestops, fire containments, and construction joints.
4. Certificate of inspection and acceptance by authority having jurisdiction of firestops, fire containments, and construction joints.

1.5 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Agenda: Include discussion and agreement upon acceptable:
1. Product and classification schedule.
2. Test firestop materials to confirm compatibility with adjacent materials and chemicals and solvents with which they may come into contact during construction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 016000.
1. Packing, Shipping, Handling, and Unloading: Deliver materials in manufacturer's unopened containers with manufacturers name, product identification, lot number, UL labels or labels of other nationally recognized independent testing agency, and mixing and installation instructions.
2. Storage and Protection: Store materials to prevent deterioration and damage due to moisture, temperature change, and contamination.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
1. Comply with manufacturer's temperature and humidity limitations before, during, and after installation.
2. Do not install firestopping products when ambient or substrate temperatures are outside limitations recommended by manufacturer.
3. Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.
4. Comply with ventilation requirements specified in Section 015000.

1.8 SEQUENCING

A. Sequence Work properly with adjacent work to allow unobstructed access to all areas needing firestops and smokeseals..
1. Identify penetrations and openings requiring firestops, smoke seals, fire containments, and construction joints.
2. Schedule installation of firestopping after completion of work involving penetrating items, but prior to covering, concealing, and eliminating access to penetrations.
3. Coordinate with work of other trades

B. Inspection: Request inspection of firestops by authority having jurisdiction and testing consultant before concealment.
1. Sequence work to permit installation to be inspected and approved prior to being concealed.
2. Ensure that subsequent openings and penetrations are reported, properly firestopped, and inspected.

PART 2 - PRODUCTS

2.1 FIRESTOPPING DEVICE AND SYSTEM MANUFACTURERS

A. Acceptable Manufacturers:
1. Specified Technologies Inc., Sommerville, NJ.
2. Hilti Corp., Tulsa, OK.
3. 3M Fire Protection Products, St. Paul, MN.

B. Acceptable Edge of Slab Manufacturers:
   1. Specified Technologies Inc., Sommerville, NJ.
   2. 3M Fire Protection Products, St. Paul, MN.
   3. United States Gypsum (USG), Chicago, IL.

2.2 SYSTEMS

A. Description:
   1. Latex Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture.
   2. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.
   3. Mortar: Portland cement based dry-mix product formulated for mixing with water at Project site to form a non-shrinking, water-resistant, homogenous mortar.
   4. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag).

B. Performance Criteria:
   1. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
   2. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
   3. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
   4. Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur.
   5. When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.
   6. Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words “Chase Wall Optional”.
   7. Provide fire-resistive joint sealants sufficiently flexible to accommodate movement such as thermal expansion and other normal building movement without damage to the seal.
   8. Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criteria as outlined in Standards, ASTM E1399, ASTM E-1966 or ANSI/ UL 2079.
   9. Provide penetration firestop systems, fire-resistive joint systems, or perimeter fire barrier systems subjected to an air leakage test conducted in accordance with Standard, ANSI/ UL1479 for penetrations and ANSI/UL2079 for joint systems with published L-Ratings for ambient and elevated temperatures as evidence of the ability of firestop system to restrict the movement of smoke.
   10. Provide T-Rating Collar Devices tested in accordance with ASTM E-814 or ANSI/UL1479 for metallic pipe penetrations requiring T-Ratings per the applicable building code.
   11. Materials must be non-corrosive and compatible with synthetic cable jackets.
   12. Materials must have flame spread less than 25 when tested according to ASTM E84.
   13. Mixes: If mixing is required, mix components as instructed by manufacturer.
   14. Top of partition assembles: Combination of safing insulation and flexible fire rated smoke seal tested and approved for dynamic movement complying with ANSI/UL2079 Test for Fire Resistance of Building Joint Systems (cyclic test).
   15. Provide typical dynamic assemblies complying with ASTM E1399 and UL 2079 for fire rated assemblies exposed to movement such as: head of wall joints; floor to floor joints; floor to wall joints; wall to wall joints; undersides of metal decks; tops of walls; undersides of composite decks; and fire-rated control, construction, and expansion joints.

C. Systems: Comply with code for firestopping systems for each condition encountered.

D. Safing Insulation, Foil Faced:
1. General: Mineral fiber composition, foil faced.
2. Classification:
   a. ASTM C612, Class 1 or 2.
   b. ASTM C665: Type III, Class A.
3. Density and Thickness: Manufacturers recommended to achieve indicated fire rating.
4. Combustion Characteristics: ASTM E136, noncombustible.
5. Fire rating: ASTM E84, flame spread 25 or less and smoke development 10 or less.
6. Acceptable Products:
   a. United States Gypsum Company, Chicago, IL: Thermafiber Safing Insulation.
   b. Roxul SAFE, Roxul.

E. Accessories: Provide accessories required by manufacturer, UL or other testing agency, and classification for specific application.
1. Retaining Collars: Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item
2. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film
3. Composite Sheet: Intumescent material sandwiched between a galvanized steel sheet and steel wire mesh protected with aluminum foil.
4. Cast-In-Place Firestop Device: Single component molded firestop device installed on forms prior to concrete placement with totally encapsulated, tamper-proof integral firestop system and smoke sealing gasket.
5. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use on steel HVAC ducts.
6. Firestop Plugs: Re-enterable, foam rubber plug impregnated with intumescent material for use in blank openings and cable sleeves.
7. Fire-Rated T Rating Collar Device: Louvered steel collar system with synthetic aluminized polymer coolant wrap installed on metallic pipes where T Ratings are required by applicable building code requirements.
8. Fire-Rated Cable Grommet: Molded two-piece grommet made from plenum grade polymer with a foam inner core for sealing individual cable penetrations up to 0.27 in. (7 mm) diameter.
9. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag.
10. Fire Rated Cable Pathways: Re-enterable device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill. These device modules shall be engineered such that two or more devices may be ganged together for greater capacity.
11. Steel wire, wire mesh, clips, sleeves, anchoring devices, primers, and other materials.
12. Metal Sheets and Shapes: Size and thickness as required by fire resistant system.
13. Fibrous Fire Safing Adhesive: As instructed by manufacturer.
14. Fibrous Fire Safing Clips/Fasteners: As instructed by manufacturer.
15. Sealant Primers: As instructed by manufacturer.
16. Sealant Damming Materials:
   a. Non-combustible.
   b. Chemically compatible with sealant.
   c. Mineral fiberboard, mineral fiber matting, or fibrous fire safing.
17. Cleaning Solvents: As instructed by manufacturer.
18. Labels:
   a. Provide label for each firestop condition.
   b. Type information in non-fading ink on 20 pound (minimum) paper.
   c. Include following information on each label:
      1) Manufacturer's name.
      2) Product name.
      3) Product type (sealant, putty, mortar, or other generic material description).
      4) F-Rating.
      5) T-Rating. State when not required for condition.

6) Testing and listing agency filing number, such as UL System number.

F. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
   1. Current requirement refers to the date on which the materials are installed in the building.
   2. SCAQMD Rule #1168 is referenced in section 018113 that was current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
   3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

G. Select adhesives, primers and sealants meeting Cal-GREEN requirements.
   1. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
   2. Sealants and Sealant Primers shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that permanent penetration items have been installed and that temporary penetrating items have been removed.

C. Verify that supports have been installed on both sides of penetrated construction as required by UL classifications.

D. Inspect and verify that surfaces and condition of openings have no defects that could interfere with installation and performance of firestop materials.

E. Verify sleeves installed under plumbing, mechanical, and electrical work are properly installed.

3.2 PREPARATION

A. Clean surfaces of opening substrates free of dirt, oil, grease, loose and harmful materials which may adversely affect bond of materials to surfaces in accordance with manufacturers recommendations.

B. Test surfaces which have been previously painted, sealed, and treated with other coatings and compounds to ensure compatibility with materials and proper bond capability.

C. Remove incompatible coatings and materials which may affect firestop bond with surrounding surfaces.

D. Mask and protect adjacent surfaces from damage.

E. Prime surfaces as instructed by manufacturer.

3.3 FIRESTOPPING INSTALLATION

A. General: Install in accordance with Section 017300, manufacturer's details, applicable codes, UL or other testing agency classification requirements, and approved schedule and shop drawings.
   1. Fire resistant systems without UL or other testing agency classification requirements shall be approved by authorities having jurisdiction before installation.
   2. Install firestopping material in manner required to achieve F rating and T rating required by UL classification, applicable codes, and authorities having jurisdiction.
   3. Install firestopping material with sufficient pressure to ensure uniform density and texture, and to ensure proper filling and sealing of openings to create smoke seal.
   4. Install forms and supports to arrest liquid and flowable material leakage and retain materials in openings.
   5. Remove form materials after firestopping material has cured unless materials used are permitted or required to remain according to test classifications.

B. Through Penetration Firestopping Systems: Comply with classification design requirements. Separate cables not in conduit and maintain required separation of penetrating items from edges of openings and from each other.
   1. Tool and trowel exposed surfaces to smooth finish, flush with surrounding surfaces unless otherwise required by test classification.
   2. Remove excess firestop material promptly as work progresses.

C. Through Penetration Firestopping:
   1. Securely attach device frames to supporting construction.
   2. Assembly component parts to ensure proper contact and sealing of gaps and openings around penetrating items.

D. Fire Resistant Construction Joints:
   1. Provide fire resistant systems to match fire rating of adjacent construction.
   2. Provide fire resistant systems at following locations:
      a. Voids and gaps in fire rated construction, including control joints and gap at top of fire-rated CMU walls.
      b. Fire rated partition and metal deck flutes.
      c. Changes in partition material.
      d. Floor joints not requiring expansion joint.
      e. Other locations indicated and required by applicable codes.

3.4 FIELD QUALITY CONTROL

A. Site Inspections: Comply with Section 014500.

B. Inspection: Owner will engage and pay for services of independent testing consultant to perform quality control inspection.

C. Do not conceal firestops, fire containments, and fire resistant construction joints prior to required inspection.

D. Notify authority having jurisdiction and designated inspectors of work released for inspection.

E. Labels:
   1. Provide label for each firestop/smoke seal condition.
   2. Securely fasten label immediately adjacent to firestopping condition to allow authorities having jurisdiction and owner's inspection agency to readily identify and confirm system.
   3. Wall partitions are required to have protected openings or penetrations permanently identified with signs or stenciling. Such identification shall be located in accessible concealed floor, floor-ceiling or *attic* spaces:
      a. Be repeated at intervals not exceeding 30 feet measured horizontally along the wall or partition; and
      b. Include lettering not less than 0.5 inch in height, incorporating the suggested wording: "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," also identify wall specific rating 1 HR, 2 HR etc…as indicated on architectural drawings.

F. Inspection Requirements:
   1. Visually examine firestopping, fire containments, and fire resistant construction joints to verify compliance with Contract Documents.
   2. Examine firestopping, fire containments, and fire resistant construction joints for proper installation, adhesion, and curing appropriate for each material.
   3. Submit written inspection report including following information:
      a. Identify construction penetrated including fire resistance rating.
      b. Identify penetrating item.
      c. Identify products and manufacturers included in each system.
      d. Identify form material used.
      e. Firestop classification and description from UL, FM, Warnock Hersey or other independent testing agency.
      f. Fire containment and fire resistant construction joint description.
      g. F and T rating.

h. State whether firestop, fire containment, and fire resistant construction joint is or is not in full compliance with testing agency classification, description and manufacturer's requirements. If variations occur confirm acceptance of variation by manufacturer and authority having jurisdiction.

G. Re-examine firestopping, fire containments, and fire resistant construction joints immediately prior to concealment by other construction to ensure no damage has occurred since initial inspection.

H. Correct unacceptable firestopping, fire containments, and fire resistant construction joints, and provide additional inspection, to verify compliance with this Section, at no additional cost to Owner.

3.5 REPAIRS AND MODIFICATIONS

A. Identify damaged and re-entered seals requiring repair and modification.

B. Remove loose and damaged materials.

C. If penetrating items are to be added, remove enough material to permit penetration by new elements, being careful not to damage balance of seal.

D. Repair holes, cracks, and damage in accordance with manufacturer's instructions to ensure complete smoke seal.

E. Use only materials approved by manufacturer of original seal as suitable for repair.

3.6 CLEANING

A. General: Comply with Section 017400.
1. Clean as instructed by manufacturer. Do not use materials or methods which may damage firestop or surrounding construction.
2. Remove stains and correct damage to adjacent surfaces.

3.7 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect material subject to traffic from damage.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 034900 – Glass Fiber Reinforced Concrete.
   2. Section 076200 - Flashing and Sheet Metal.
   3. Section 078400 - Firestopping.
   4. Section 079513 - Expansion Joint Cover Assemblies.
   5. Section 084113 - Aluminum Framed Entrances and Storefronts.
   6. Section 084229 - Automatic Entrances.
   7. Section 084413 - Glazed Aluminum Curtain Walls.
   8. Section 085113 - Aluminum Windows.
   9. Section 092900 - Gypsum Board.
   10. Section 093000 - Tiling.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Adhesives and sealants shall meet or exceed the VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

1.2 DEFINITIONS

A. Use definitions in ASTM C717.

B. Non-Bleeding: Not capable of exuding liquid chemical components of sealant.

C. Non-Staining: Not capable of discoloring joint substrate.

D. Sealant System: Sealant, sealant backing, and primer intended for use in particular condition.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data and product specifications for each product.
   2. Include data to indicate chemical characteristics, performance criteria, limitations, substrate preparation, installation requirements, and curing requirements.
   3. Include information for accessories and other required components.
   4. Include color charts indicating manufacturer’s full color range available of each sealant type for Architect’s initial selection.

C. Samples: Submit four 1/4 inch diameter by 2 inch long samples illustrating sealant colors for each product exposed to view.

D. Submit following Informational Submittals:
   1. Test Reports: Submit written results of testing specified as part of Source and Field Quality Control articles.
   2. Certifications specified in Quality Assurance article.
   3. Qualification Data: Manufacturer's and installer's qualification data.
   4. Manufacturer's instructions. Include requirements for surface preparation, priming, joint size ratios, adhesion testing, and perimeter conditions requiring special attention.
   5. Manufacturer's field reports.

E. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Warranty: Submit specified warranty.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:

1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
   a. Adhesives and sealants.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Special Condition: Provide sealant for sealing control joints in exterior cement plaster system that is compatible with elastomeric coating that will be applied over plaster system for 10-year unified warranty of exterior wall. Provide special agreement if necessary to have sealant included in plaster warranty.
   2. Provide products for each sealant system from one manufacturer for entire Project, unless otherwise acceptable to Architect.
   3. Provide products from a single manufacturer to ensure material compatibility where different sealant materials come in direct contact with each other.
   4. Provide each sealant system as complete unit, including accessory items necessary for proper function.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum 5 years experience.

C. Applicator Qualifications: Acceptable to manufacturer, specializing in applying sealants, with experience on at least 5 projects of similar nature in past 5 years.

D. Certifications:
   1. Manufacturer's Certification that Products:
      a. Furnished for Project meet or exceed specified requirements.
      b. Assembled for each joint are compatible with each other and with joint substrates under conditions of service and application.
      c. Are suitable for the indicated use.
   2. Manufacturer's certification that sealants, primers, and cleaners, comply with local regulations controlling the use of volatile organic compounds.
   3. Contractor's and installer's certification that products are installed in accordance with Contract Documents, based on inspection and testing specified as part of Field Quality Control.

1.5 FIELD SAMPLES

A. General: Comply with provisions of Section 014500.

B. Preconstruction Field Sample:
   1. Construct sealant joint mock-up 5 feet long for elastomeric joint sealants specified in this Section.
   2. Position at location indicated directed by Architect.
   3. Construct minimum of 3 weeks prior to scheduled installation.
   4. Perform "field hand-pull adhesion test" described under Field Quality Control, one per each different substrate on the building exterior envelope. Pull Test to be performed 21 days after installation of field sample.

1.6 MOCK-UPS

A. General: Comply with provisions of Section 014500.

B. Visual Mock-Up:
   1. Seal joints in mock-ups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section.
   2. Visual mock-up may be used for preconstruction field test mock-up of assemblies specified in other Sections.
   3. Construct minimum of 3 weeks prior to scheduled installation.
   4. Demonstrate:
      a. Selections made from submittal samples.

b. Sealant color and aesthetic effects.
c. Material and installation qualities.
d. Placement of two-stage seals, including sequence and curing procedures.

5. Perform "field hand-pull adhesion test" described under Field Quality Control, one per each different substrate on the building exterior envelope. Pull Test to be performed 21 days after installation of field sample.

1.7 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Convene pre-installation conference 3 weeks prior to commencing work of this Section.

C. Conference Purpose and Agenda:
1. Visit Project site to analyze site conditions, and inspect surfaces and joints to be sealed in order that recommendations may be made should adverse conditions exist.
2. Review mock-up and field sample.
3. Discuss following items:
a. Substrate conditions.
b. Preparatory work.
c. Weather conditions under which work will be done.
d. Anticipated frequency and extent of joint movement.
e. Joint design.
f. Sealant installation procedures.

1.8 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

B. Deliver materials to site in unopened containers and bundles with labels indicating:
1. Manufacturer’s name.
2. Product name and designation.
3. Color.
4. Expiration period for use.
5. Working life.
6. Curing time.
7. Mixing instructions for multi-component materials.

C. Storage and Protection:
1. Store products within manufacturer’s required temperature and humidity ranges.
2. Prior to use, condition products within manufacturer’s required temperature range, humidity range, and time period.

1.9 PROJECT CONDITIONS

A. Environmental Requirements:
1. Apply sealant when the following are within manufacturer’s limits during and for 24 hours after sealant installation:
2. Ambient and surface temperatures.
3. Relative humidity.
4. Do not apply sealants to wet or frozen surfaces.
5. Comply with manufacturer’s requirements regarding application of sealants in vicinity of curing sealants of a different material.

1.10 SEQUENCING

A. Coordinate work with Sections referencing this Section.

B. Coordinate installation of sealants with substrates to which they are applied.

1.11 WARRANTY

A. Provide warranties under provisions of Section 017800.

B. Warrant installed products to be free from defects in material, labor, or installation techniques for 20 years on silicones used at exterior building envelope, 5 years on urethanes used at exterior building envelope, 2 years at sealants used at interior locations.

C. Include coverage for installed sealants and accessories which:
   1. Fail to achieve air tight seal.
   2. Fail to achieve watertight seal.
   3. Exhibit loss of adhesion.
   4. Exhibit loss of cohesion.
   5. Do not cure.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acrylic Latex (Designation AL):
   1. Description:
      a. ASTM C834.
      b. Non-sag; non-staining; non-bleeding.
      c. Joint movement range without cohesive/adhesive failure: Plus 7.5 percent to minus 7.5 percent of joint width.
      d. Color: As selected by Architect from manufacturer's full color range.
   2. Acceptable Products:
      a. AC-20, Pecora Corporation.
      b. Sonolac, Sonneborn Building Products.
      c. Acrylic Latex Tremflex 834, Tremco, Inc.

B. Silicone—General Purpose (Designation S-GP):
   1. Description:
      a. ASTM C920:
         1) Type: S
         2) Grade: NS
         3) Class: 50
         4) Uses: NT, [M,] G, A, O
      b. Single component, neutral curing, non-staining, non-bleeding silicone sealant.
      c. Medium modulus silicone for metal to metal and metal to adjacent substrates; Low modulus silicone for all other locations.
      d. Joint movement range without cohesive/adhesive failure: Plus 50 percent to minus 50 percent of joint width.
      e. Color: Selected by Architect from manufacturer's full color range [Custom color].
      f. Acceptable Medium Modulus Products:
         1) 795, Dow Corning.
         2) Silpruf, General Electric.
         3) Spectrem 2, Tremco.

C. Silicone Extrusion Seal (Designation S-ES):
   1. Preformed, ultra low modulus silicone extrusion seal.
   2. Locations: Horizontal surface of glass fiber reinforced concrete parapet joints as weather seal. Medium modulus silicone as specified above in parapet joints.
   3. Seal width: Joint width plus 1/2 inch bonding area on each side of joint (Joint width plus 1 inch).
   4. Adhesive: 795, Dow Corning.
   5. Color: Selected by Architect from manufacturer's full color range.
   6. Acceptable Product: 123 Silicone Seal, Dow Corning.

D. Silicone—Sanitary (Designation S-S):
   1. Description:
      a. ASTM C920:
         1) Type: S
         2) Grade: NS
         3) Class: 25

4) Uses: NT, M, G, A, O
b. Neutral or acid curing, non-staining, non-bleeding, fungicide-containing.
c. Color: White [Selected by Architect from manufacturer's full color range].
d. Complying with United States Food and Drug Administration Regulation 21 CFR-177-6000.

2. Acceptable Products:
a. 786 Mildew-Resistant Silicone Sealant, The Dow Chemical Company.
b. Sanitary 1700, General Electric Silicones.
c. Tremsil 200 Sanitary, Tremco

E. Urethane—Traffic-Bearing (Designation U-TB): ASTM C920, Type S, Grade P:
1. Sealant containing mercury not allowed.
2. Class: 25. Joint movement range without cohesive/adhesive failure: Plus 25 percent to minus 25 percent of joint width.
3. Uses: T, M, O
4. Chemical curing, non-staining, non-bleeding.
5. Shore A Hardness: 40 minimum, ASTM C661.
6. Color: As selected by Architect from complete range available from manufacturer.
7. Acceptable Products.
a. NR-201, Pecora.
b. Vulkem 45, Tremco.
c. Sikaflex 15 LM SL, Sika.
d. SL 1 Sealant, Sonneborn Division of BASF Building Systems.Shakopee, MN.

2.2 ACCESSORIES

A. Joint Cleaner:
1. Chemical cleaners required by sealant manufacturer for substrates encountered, compatible with sealant backing bond breaker materials.
2. Free of substances capable of staining, corroding, or harming:
a. Joint substrates.
b. Adjacent nonporous surfaces.
c. Sealant.
d. Sealant backing.
3. Formulated to promote optimum adhesion of sealants to joint substrates.

B. Primer:
1. Dyed coating material required by sealant manufacturer for enhancing sealant adhesion to joint substrates.
2. Non-staining to joint substrate beyond the substrate surface.
3. Required for use unless not required by results of:
a. "Manufacturer's sealant-substrate compatibility and adhesion test" described under Source Quality Control.
b. "Field hand-pull adhesion test" under Field Quality Control.

C. Sealant Backing Bond Breaker Rod:
1. Non-staining material.
2. Compatible and non-adhering to sealant when tested in accordance with ASTM C1087.
3. Compatible with sealant, joint substrates, primers, and other sealant backing bond breakers.
4. Sealant manufacturer approved.
5. Sized and shaped to provide optimum performance and backing to sealant.
6. Preformed, compressible, resilient, non-staining, non-outgassing, non-waxing, non-extruding, cylinder-shaped plastic foam rods compliant with ASTM D1056.
7. Open Cell Polyurethane: Use not permitted unless required by sealant manufacturer.
8. Closed Cell Polyethylene:
a. Non-absorbent to liquid water.
b. Use in wall and ceiling joints unless otherwise required by sealant manufacturer.
9. Reticulated Polymeric: Sof®-Rod, Nomaco, Inc.

10. Unless otherwise required by sealant manufacturer, oversize rod to be larger than joint width by following minimum amounts:
    a. Open Cell Polyethylene: 50 percent.
    b. Closed Cell Polyethylene: 33 percent.
    c. Reticulated Polymeric: 25 percent.

D. Elastomeric Tubing Joint Filler:
1. Neoprene, butyl, EPDM, or silicone tubing compliant with ASTM D1056.
2. Shore A hardness of 70.
3. Compatible with sealant, joint substrates, primers, and other sealant backing bond breakers.
4. Use in pavement joints, unless otherwise required by sealant manufacturer.
5. Use sealant backing bond breaker tape to separate sealant from rod.
6. Unless otherwise required by sealant manufacturer, oversize rod to be larger than joint width by 25 percent the following minimum amounts:

E. Sealant Backing Bond Breaker Tape:
1. Pressure sensitive polyethylene tape or tetrafluorethylene self-adhesive tape required by sealant manufacturer to suit application.
2. Minimum Thickness of 11 mils.

F. Masking Tape: Non-staining, non-absorbent material compatible with sealants and surfaces adjacent to joints.

G. Tooling Liquids: Non-staining material approved by manufacturer to reduce adhesion of sealant to joint finishing tools.

H. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
1. Current requirement refers to the date on which the materials are installed in the building.
2. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
4. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
5. Sealants shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

2.3 MIXES

A. Comply with manufacturer's instructions.

B. Mix thoroughly with mechanical mixer without mixing air into sealants.

C. Continue mixing until sealant is uniform in color and free from streaks of unmixed materials.

2.4 SOURCE QUALITY CONTROL

A. General: Comply with requirements of Section 014500.

B. Tests:
1. Coordinate testing of sealant compatibility and adhesion to:
    a. Sealant backing materials.
    b. Glass fiber reinforced concrete specified in Section 0345900.
    c. Entrance system specified in Section 084113.
    d. Window system specified in Section 085113.
    e. Curtain wall system specified in Section 084413.
    f. Tile specified in Section 093000.
2. Manufacturer's Sealant-Substrate Compatibility and Adhesion Test:
    a. Test Methods:
        1) Determine if priming and other specific joint preparation techniques are not required to obtain rapid, optimum adhesion of sealants to joint substrates.
        2) Comply with ASTM C510, ASTM C794, and ASTM C1087.

b. Submit not less than 9 pieces 3 by 5 inches in size of each type of material, including joint substrates, shims, sealant backing, and miscellaneous materials.
c. Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.
d. Investigate sealant material's failing compatibility/adhesion tests and obtain manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
e. Include in Test Report, Manufacturer's:
   1) Interpretation of test results regarding sealant performance.
   2) Primers and substrate preparation required to achieve adhesion.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.
B. Ensure that concrete and masonry have cured minimum of 28 days.
C. Verify that sealant backing is compatible with sealant.
D. Verify that substrate surface:
   1. Is within manufacturer's moisture content range.
   2. Complies with manufacturer's cleanliness and surface preparation requirements.
E. Joint Width:
   1. Verify joints are greater than minimum widths required by manufacturer.
   2. If joints are narrower than minimum required widths, widen narrow joints to indicated width.
   3. Do not place sealant in joints narrower than manufacturer's required minimum.

3.2 PREPARATION

A. Prepare, clean, and prime joints in accordance with manufacturer's instructions.
B. Remove loose materials and matter which might impair adhesion of primer and sealant to substrate.
C. Remove form release agents, laitance, and chemical retarders, which might impair adhesion of primer and sealant to concrete and masonry surfaces.
D. Comply with ASTM C1193.
E. Protect elements adjoining and surrounding work of this Section from damage and disfiguration.
F. Priming:
   1. Prime joint substrates unless priming is not required by:
      a. "Manufacturer's sealant-substrate compatibility and adhesion test" described in Source Quality Control article.
      b. "Field hand-pull adhesion test" described in Field Quality Control article.
   2. Apply primer to substrate areas where joint sealant is to adhere.
   3. Comply with manufacturer's sequencing requirements for joint priming and sealant backing bond breaker rod installation to assure required primer application coverage and rate without placement of primer on backer rod surface to be in contact with sealant and avoid three-sided sealant adhesion.
   4. Do not allow spillage and migration of primer onto surfaces not to receive primer.
   5. Install sealant to primed substrates after primer has cured.
G. Masking Tape:
   1. Use masking tape to prevent contact of primer and sealant with adjoining surfaces that would be permanently stained or damaged by:
      a. Contact with primer and sealant.
      b. Cleaning methods used to remove primer and sealant smears.
   2. Place continuously along joint edges.
   3. Apply masking tape so it does not shift in position after placement.

3.3 APPLICATION

A. General:
1. Comply with requirements of Section 017300.
2. Comply with results and recommendations from:
   a. "Manufacturer's compatibility and adhesion test" described in Source Quality Control Article.
   b. "Field hand-pull adhesion test" described in Field Quality Control article.
3. Provide compatible sealant system between dissimilar assemblies and adjacent construction.
4. Seal locations necessary to create and secure continuous air, water, and vapor enclosure even though Contract Documents may not indicate all locations; do not seal weep holes.
5. Seal to prevent migration of water, vapor, and air through joints.
6. Comply with manufacturer's required application temperature and relative humidity ranges. Consult manufacturer when sealant cannot be applied within these ranges.

B. Sealant Backing Bond Breaker:
1. Measure joint dimensions and size materials to achieve manufacturer-required width-to-depth ratios.
2. Install to achieve sealant depth and sealant contact depth no greater than distance required by manufacturer for sealant material, joint width, and joint movement range.
3. Install using blunt instrument to avoid puncturing.
4. Do not:
   a. Twist, puncture, and tear material.
   b. Leave gaps between ends of material pieces.
   c. Stretch or compress material along its length.
   d. Stretch or compress tape material along its width.
5. Install to provide optimum joint profile and in manner to provide not less than [(1/4 inch)] sealant depth when tooled.
6. Install tape where insufficient joint depth makes use of rod not possible. Match tape width to joint width to prevent three-side adhesion. Do not wrap tape onto sides of the joint.
7. Replace backing bond breaker materials which have become wet with dry materials prior to sealant application.

C. Sealant:
1. Install sealants at same time as installation of backing bond breaker materials.
2. Do not exceed manufacturer's required:
   a. Material shelf life.
   b. Material working life.
   c. Installation time after mixing.
3. Comply with manufacturer's requirements for applying different sealant materials in direct contact with each other.
4. Use gun nozzle size to suit joint size and sealant material.
5. Install sealant with pressure-operated devices to form uniform continuous bead.
6. Use sufficient pressure to fill voids and joints full.
7. Install to adhere to both sides of joint.
8. Install to not adhere to back of joint; provide sealant backing.
9. Install sealant free of air pockets and embedded matter.
10. Recess sealant [(1/8 inch)] from surface of pavements and horizontal surfaces.

D. Sealant Tooling:
1. Comply with manufacturer's tooling method requirements.
2. Tool sealant within manufacturer's tooling time limits.
3. Tooling liquids:
   a. Comply with manufacturer's requirements regarding use.
   b. Do not use when not permitted by manufacturer.
   c. Do not allow tooling liquids to come in contact with surfaces receiving sealant.
4. Produce smooth exposed surface.
5. Tool Sealant to be Free of:
   a. Air pockets and voids.

b. Embedded impurities.
c. Surface ridges, sags, and indentations.

6. Achieve full sealant contact and adhesion with substrate.
7. Form a concave tooled joint shape indicated in Section A of Figure 5 of ASTM C1193, unless otherwise indicated.
8. Remove excess sealant from surfaces adjacent to joint.
9. Allow acrylic latex sealant to achieve firm skin before paint is applied.

E. Silicone Extrusion Seal:
1. Prepare substrate in accordance with manufacturer's instructions.
2. Apply masking tape at edge of bonding areas.
3. Apply bead of adhesive to each side of joint within bonding area in accordance with manufacturer's application rate.
4. Ensure bonding area is 3/8 inch wide minimum.
5. Press extrusion seal into adhesive within 10 minutes of adhesive application.
6. Use roller on seal to apply pressure to ensure uniform contact.

F. Masking Tape:
1. Remove immediately after tooling sealant and before sealant skin forms.
2. Remove without disturbing sealant.

3.4 FIELD QUALITY CONTROL

A. General: Comply with requirements of Section 014500.

B. Field Hand-Pull Adhesion Test:
1. At field sample:
a. Before sealant installation is commenced, test materials for indications of staining and poor adhesion to substrate.
b. Perform after sealants have fully cured.
c. Perform under observation of [Architect and] manufacturer's technical representative.
2. Subsequent to commencement of sealant installation:
a. Perform under observation of manufacturer's technical representative.
b. Perform minimum of 4 times prior to completion of sealant installation.
c. Schedule tests at evenly-spaced intervals during sealant installation at discretion of sealant manufacturer.
3. Procedure:
a. Make knife cut through sealant from side to side of joint.
b. At joint's sides, make two cuts approximately 2 inches long meeting cut made across joint width.
c. Place a mark on cut portion of sealant 1 inch from cut across joint width.
d. Use fingers to grasp 2 inch piece of sealant firmly between mark and cut across joint width.
e. Pull cut portion outward at an angle of 90 degrees from sealant face.
f. Use a ruler to measure distance that sealant is pulled.
g. Pull uncut sealant out of joint to distance recommended by manufacturer for testing adhesive capability, but not less than a distance equal to maximum movement capability in extension.
h. Hold extended sealant for a minimum of 10 seconds.
i. If adhesion is proper, sealant should tear cohesively in itself or be difficult to adhesively remove from joint substrate.
4. Summarize test results in test report. Indicate:
a. Sealants tested.
b. Joint substrates.
c. Cohesive failures.
d. Adhesive failures.
e. Pull distance used.
f. Actions to correct failures and non-complying conditions.
5. In absence of noncomplying conditions, sealants which do not indicate adhesive failure from testing will be considered satisfactory.

6. Replace sealant removed from test locations by applying sealant in accordance with manufacturer's requirements for applying sealant to previously sealed joints.

3.5 CLEANING

A. Clean excess sealants and sealant smears from adjacent surfaces as application progresses; comply with sealant manufacturer's requirements and manufacturer of surface in which joints occur.

B. Repair or replace defaced or disfigured finishes caused by work of this Section and replace where installation techniques result in unsatisfactory joining of materials and unsightly conditions.

3.6 PROTECTION

A. Protect in accordance with Section 017300.

B. Protect sealants from contamination until cured.

C. Protect sealant joints in horizontal surfaces from foot and vehicular traffic until cured.

3.7 SCHEDULE

A. Items Not to be Sealed:
   1. Joints covered by joint covers and seals specified in Section 079500.
   2. Joints, perimeter, and penetrations in fire-rated assemblies. Use firestopping specified in Section 078400.
   3. Joints, perimeter, and penetrations in sound-rated assemblies. Use acoustical sealant specified with sound-rated assembly in Section 092900.
   4. Weep holes in metal railings, windows , and doors.

B. Sealant Schedule:
   1. Exterior Locations:
      a. Wall Joints: Designation S-GP; use primer where required by manufacturer.
      b. Joints and Perimeter of Penetrations in Horizontal Pedestrian and Vehicle Traffic Surfaces: Designation U-TB.
   2. Interior Joints:
      a. Wall and Ceiling Joints subject to Movement: Designation S-GP.
      b. Wall and Ceiling Joints not subject to Movement: Designation AL.
      c. Interior side of exterior openings: S-GP.
      d. Floor Joints, including tile: Designation S-S.
      e. Joints subject to Continuous Immersion in Water: Designation PS.
      f. Interior Sanitary Joints; Joints Between Plumbing Fixtures and Adjoining Floor, Wall, and Ceiling Surfaces; Joints Between Shower Door Enclosure Components and Adjacent Finish Surfaces; Joints Between Back Splashes and Wall Substrates: Designation S-S.

END OF SECTION

SECTION 079513

EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 031000 - Concrete Forming and Accessories.
   2. Section 033000 - Cast-In-Place Concrete.
   3. Division 22 - Plumbing.

B. This Project is a US Green Building Council LEED project.
   1. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM DESCRIPTION

A. Design Requirements: Provide concealed fastening wherever possible.

B. Performance Requirements:
   1. Permit unrestrained movement of joint without disengagement of cover.
   2. Provide seal assembly for joint width and expansion dimensions.
   3. Provide units to accommodate joints size, variations in adjacent surfaces, and dynamic movement without material degradation or fatigue when tested in accordance with ASTM E1399.

C. Fire Resistance Requirements:
   1. Test fire rated cover assemblies or fire-rated barrier component of joint cover assembly at maximum joint width with field splice in accordance with ASTM E119 or E814 [,NFPA 251].
   2. Classify by Underwriters Laboratories, Warnock Hersey, or other fire testing agency acceptable to authority having jurisdiction.
   3. Fire rating not less than rating of adjacent construction.
   4. Flame spread index of 25 or less, when tested in accordance with ASTM E84.
   5. Smoke generated index of 0 to 450, when tested in accordance with ASTM E84.

D. Structural Requirements:
   1. Minimum allowable uniform load of floor cover plate 200 psf.
   2. Maximum cover plate deflection of 1/240 maximum expected opening when fully loaded.

E. Interface with Adjacent Systems: Design watertight transition from joint to joint.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for expansion joints.
   2. Include data to indicate nominal joint size, joint movement range, percentage of movement from nominal joint size, and quantity of axial dimensions through which joint can move.
   3. Include information for factory finishes, sealants, and other required components.
   4. Include color charts for color-finished items indicating manufacturer's full range of colors available for selection.

C. Shop Drawings:
   1. Indicate layout including locations, dimensions, profiles, fabrication details, interface with adjacent construction, anchorage, frequency of attachment, finishes, splices, joints, miters, and accessories.
   2. Submit detail drawings of special accessory components not included in manufacturer's product data.

D. Samples: Submit 12 inch in size illustrating each joint cover type.

E. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Manufacturer's qualification data.

3. Manufacturer's instructions.

F. LEED Data: Furnish special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Submit special materials cost data breakdown data for the following materials. Furnish separate data for each different manufacturer used:
      a. Seismic Joint covers.
   2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Seismic Joint covers.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Furnish each product from one manufacturer for entire Project, unless otherwise acceptable to Architect.
   2. Provide each joint cover assembly as complete unit, including fire and moisture barriers, resilient inserts, anchors, and accessory items necessary for proper operation.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years experience.

C. Regulatory Requirements: Ensure flammable components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.

D. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 SEQUENCING

A. Coordinate formed blockouts and recesses in concrete to receive joint cover assemblies with Sections 031000 and 033000.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Architectural Art Manufacturing, Inc.
   2. Balco/Metalines.
   3. Conspec Systems, Inc.
   4. The D. S. Brown Company.
   5. MM Systems Corporation.
   6. Watson Bowman Acme.

2.2 MATERIALS

A. Steel Shapes: ASTM A36.

B. Aluminum:
   1. Extrusions:
      a. ASTM B221.
      b. Alloy: 6061-T6 or 6063-T5.
   2. Plate and Sheet:
      a. ASTM B209.
      b. Alloy:
         1) Plate: 6061-T6 or 6061-T651.
         2) Sheet: 5052-H32.

C. Stainless Steel: ASTM A240, UNS S30200 or S30400.

D. Resilient Fillers, Inserts, and Border Strips: Neoprene, Santoprene, or extruded polyvinyl chloride, exhibiting Shore A hardness of 40 to 75 Durometer.

E. Preformed Silicone Seal: Flexible, preformed silicone rubber compound.

F. Secondary Foam Seal: Cellular polyurethane / polyester backer block factory bonded to silicone face seal

G. Moisture Barrier:
   1. Manufacturer's standard flexible Neoprene, Santoprene, or polyvinyl chloride gasket to function as water drip collection trough or moisture barrier.
   2. Minimum thickness: 30 mils.
   3. Provide with drainage fittings spaced no greater than 30 feet apart.

H. Fire Barrier: Manufacturer's standard type required for indicated fire resistance and fabricated of layers of ceramic fiber insulation, metallic insulation or silica fiber fabric.

I. Flame Sealant: Manufacturer's intumescent sealant to remain resilient to permit joint movement and, upon exposure to heat, resist penetration of fire through voids in construction.

J. Non-Shrink Grout:
   1. Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives.
   2. Minimum Compressive Strength at 28 Days: 5000 psi.
   3. Acceptable Products:
      a. Crystex, L&M Construction Chemicals, Omaha, NE.
      b. Masterflow 713, Master Builders, Cleveland, OH.
      c. Euco Rock Anchor Bolt Grout, Euclid Chemical Co., Cleveland, OH.
      d. SikaGrout 212, Sika Corporation, Lyndhurst, NJ.
      e. Five Star Grout, Five Star Products, Fairfield, CT.

2.3 MANUFACTURED UNITS

A. Minimum Bump Metal Floor Joint Cover:
   1. Description:
      a. Nominal Joint Width: 4 inches.
      b. Joint Movement Range Across Nominal Joint Width: Minus 50 percent to plus 50 percent.
      c. Accommodate movement in two axial dimensions parallel to floor surface.
      d. Material: Stainless steel.
      e. Provide with centering bar to maintain position of center cover plate between side frames.
      f. Center cover plate to have smooth surface.
   2. Acceptable Products:
      a. NB Series, Balco/Metalines.
      b. SJPF Series, Conspec Systems, Inc.
      c. ASF Series, MM Systems Corporation.
      d. FJG Series, Watson Bowman Acme.

B. Compression Seal without Integral Flange:
   1. Description:
      a. Nominal Joint Width: Refer to Drawings.
      b. Joint Movement Range Across Nominal Joint Width: Minus 30 percent to plus 30 percent.
      c. Accommodate movement in three dimensions plus torsion.
      d. Size to be in complete compression at maximum joint size.
      e. Material: Silicone.
      f. Color: As selected by Architect from Manufacturer’s standard colors.
   2. Basis-of-Design Product: MM Systems Corporation, Color Joint ESS Series or a comparable product of one of the following:
      a. The D. S. Brown Company.
      b. Conspec Systems, Inc.
      c. Watson Bowman Acme.

2.4 ACCESSORIES

A. Provide parts, devices, anchors, fasteners, spacers, flexible moisture barrier and filler, drain tubes, and other accessories required for complete, watertight installations.

B. Bituminous Paint: SSPC Paint 12.

C. Galvanizing Repair Paint: SSPC Paint 20, Type II (Organic).

2.5 FABRICATION

A. Prior to fabrication, field measure actual existing conditions to ensure proper fit.

B. Fabricate and provide anchors for installation in formed blockouts or recesses without need for cast-in-place or pre-installed anchors.

C. Factory drill anchor holes in extrusions spaced 12 inch centers. Miter cut extrusions in field to conform to directional changes. Ship extrusions in standard 10 foot or 20 foot lengths.

D. Provide in longest units in longest practical lengths to minimize quantity of intermediate joints and field splicing.

E. Fabricate with mitered and welded corners where joint changes direction or abuts other materials.

F. Fabricate with end closures, transitions, tee-joints, corners, cross-connections, and other pieces to provide continuous assembly.

G. Covers with Centering Bars:
   1. Fasten cover plate through center of centering bars.
   2. Provide centering bars with corrosion resistant coating.
   3. Provide screw sleeve to control tightening of screw connecting center cover plate to centering bar.
   4. Attach centering bars to nylon spheres or steel pins retained in tracks in extruded base members.

H. Shop assemble components and package with anchors and fittings.

2.6 FINISHES

A. Steel Shapes:
   1. Prior to galvanizing, prepare in accordance with SSPC SP-6.
   2. Galvanizing: Comply with ASTM A123.

B. Aluminum:
   1. Mill Finish: AA-M10.
   2. Schedule:
      a. Floors: Mill finish.
      b. Surfaces Contacting Concrete: Bituminous paint or manufacturer's standard protective coating.

C. Stainless Steel: Satin finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that deck, framing assemblies, and other items affecting work of this Section are in place and positioned correctly.

C. Verify that field measurements and formed recess dimensions are as shown on shop drawings.

D. Verify that joint preparation and affected dimensions are acceptable.

3.2 PREPARATION

A. Provide anchoring devices for installation [and embedding].

B. Provide templates and rough-in measurements.

C. Touch-up damaged galvanized steel surfaces in accordance with ASTM A780 using SSPC Paint 20.

3.3 INSTALLATION

A. General:
   1. Comply with manufacturer's printed instructions.
   2. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances, and alignment with surrounding construction.
   3. Install floor joints with top surface flush with finish floor surface.
   4. Rigidly anchor to substrate. Make allowances for change in joint size due to difference between installation and building operating temperatures.
   5. Install grout to encase floor-mounted joint covers in formed blockouts and recesses.
   6. Install with minimum quantity of intermediate joints and splices.
   7. Install to accommodate thermal expansion and contraction to avoid buckling of metal.
   8. Install flexible filler materials to frames with adhesive to frames with adhesive or pressure-sensitive tape as required by manufacturer.
   9. Set joint systems to proper width for ambient temperature at the time of setting.

B. Covers with Metal and Elastomeric Components:
   1. Install metal extrusions.
   2. Install elastomeric seal to form one continuous piece.
   3. Splicing field cuts/miters of cover assembly components:
      a. Metal Components: Use manufacturer-required sealant.
      b. Elastomeric Components: Use manufacturer's vulcanizing or welding procedures to provide watertight joints.

C. Compression Seals:
   1. Clean sawed/formed joint and patch spalled areas.
   2. Provide in continuous lengths for straight sections.
   3. Field splice to provide watertight joints using manufacturer's vulcanizing or welding procedures.
   4. Apply lubricant-adhesive continuously to inner faces of cleaned joint.
   5. Install to be in complete compression at maximum joint size.
   6. Compress bottom portion of seal and insert into joint.
   7. Complete installation by positioning seal within joint using manufacturer's installation tool.
   8. Comply with manufacturer requirements for sealing transitions.

3.4 ADJUSTING

A. Adjust parts for smooth, uniform operation.

B. Adjust joint cover to freely accommodate joint movement.

3.5 CLEANING

A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.

B. Clean excess primer, adhesives, sealants, and other products from components and adjacent surfaces for proper operation of assembly.

3.6 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect installation from damage by work of other trades. Where required, remove and store cover plate and install temporary protection over joints. Reinstall cover plate before completion of Work.

C. Do not permit traffic over unprotected floor joint surfaces.

D. Provide removable strippable coating or reinforced cloth tape to protect finish surfaces.

END OF SECTION

DIVISION 08

OPENINGS

SECTION 081100

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Doors, frames, and borrowed lights of hollow metal construction.

B. Related Sections:
   1. Section 081400 - Wood Doors.
   2. Section 087100 - Door Hardware.
   3. Section 088000 - Glazing.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM DESCRIPTION

A. General:
   1. Meet or exceed ANSI/SDI 250.8 and HMMA 861, and more stringent requirements specified in this Section.
   2. Fire Rated Assemblies:
      a. Fabricate assemblies as tested and approved by Underwriters Laboratories or other nationally recognized testing agency acceptable to authorities having jurisdiction.
      b. Comply with requirements of NFPA 80.
      c. Tested in accordance with of NFPA 252 or UL 10B.
      d. Identify each assembly with factory applied label indicating applicable fire rating.
      e. Assemblies at stair enclosures require maximum temperature rise not to exceed 450 degrees F above ambient temperature at end of 30 minute fire exposure test.
      f. Provide “S” label for fire rated doors and frames.
      g. Provide fire-rated doors with code complying fire rated and impact rated glazing.
   3. Hardware Preparation:
      a. Comply with ANSI A115 Series and SDI 107, except for hardware locations.
      b. Comply with Section 087100 for hardware locations.
      c. Mortise, reinforce, drill, and tap frames and doors at factory to receive mortised and concealed hardware in accordance with templates and approved hardware schedules.
      d. Reinforce frames and doors for surface mounted hardware; drilling and tapping will be in field at time of hardware application.
      e. Comply with ANSI/SDI A250.8 and SDI 107 for thickness of hardware reinforcing.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, profiles, and finishes.
   2. Include proof that doors and frames are fabricated in accordance with SDI requirements.

C. Shop Drawings:
   1. Submit schedule indicating opening identification number, door and frame types, sheet metal thickness, dimensions, swing, label, hardware requirements, and undercuts when applicable. Use same identification numbers for openings as shown by Contract Drawings.
   2. Include elevations and details indicating door and frame types, profiles, conditions at openings, methods of anchoring, hardware locations, reinforcements for hardware, core construction, and provisions for vision panels and louvers when applicable.
   3. Clearly identify work that cannot be permanently factory assembled before shipment. Indicate locations of field splice joints and include associated details to ensure proper assembly at project site.

D. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
      a. Doors (steel)
      b. Frames (steel)
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Doors (steel)
      b. Frames (steel)
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Doors (steel)
      b. Frames (steel)

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Store in protected dry area under cover.

C. Place units on wood skids and store in manner that will prevent corrosion and damage.

D. Avoid use of non-vented plastic or canvas coverings which could trap moisture.

E. Store assemblies upright, do not stack flat. Provide space between stacked assemblies to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Members of Steel Door Institute (SDI) or Hollow Metal Manufacturer's Association (HMMA).
   1. Amweld.
   2. Ceco.
   3. Curries.
   4. Pioneer.
   5. Republic.
   6. Steelcraft.

2.2 MATERIALS

A. Cold-Rolled Steel: ASTM A1008, commercial quality, Class 1, stretcher-leveled, matte finish.

B. Hot-Rolled Steel: ASTM A1011, commercial quality, pickled, and oiled.

C. Galvanized / Galvannealed Steel (Exterior and Parking Garage Locations):
   1. Sheet: ASTM A653, A40 or G40 coating designation, zinc coated by hot-dip process, commercial quality, stretcher-leveled, mill phosphatized. WCGS not permitted.
   2. Anchors and Accessories: ASTM A879, minimum Class B coating, zinc coated by electro-deposition, commercial quality, mill phosphatized.

D. Anchor Bolts, Fasteners, and Screws: Manufacturer's standard type, except cadmium or zinc plated finish. Stainless steel also acceptable.

E. Primer: Manufacturer's standard rust inhibitive primer, air-dried or baked, compatible with finish painting specified in Section 099000.

2.3 FABRICATION

A. General:
   1. Except where specified or noted otherwise, fabricate frames, door faces and edges using cold-rolled steel. Concealed stiffeners, reinforcing, and other components may be cold-rolled or hot-rolled steel at fabricator's option.

2. Fabricate frames, doors and related components using galvanized/galvannealed steel where scheduled or indicated where assemblies have exposure to exterior atmosphere, including open design parking structure, and other similar areas.
3. Fabricate sheet metal work neat in appearance and free from defects, warps, or buckles.
4. Accurately form metal to required sizes and profiles.
5. Grind and dress exposed welds smooth and flush with adjacent surfaces.
6. Remove tool marks and surface imperfections by dressing, filling, and sanding smooth. Do not use metallic filler to conceal manufacturing defects.

B. Edge Clearances:
1. Between doors and frames at head and jambs: 1/8 inch.
2. Between meeting stiles at pairs of doors: 1/8 inch.
3. Between Bottom Edge of Door and Finish Floor at Non-Label Assemblies: In accordance with HMMA 861, ANSI/SDI A250.8 except where larger undercuts are scheduled. Finish floor is defined as top surface of substrate. Where carpet or other applied surface materials are placed over floor substrate and greater than 1/2 inch thickness, provide 1/4 inch clearance.
4. Between Bottom Edge of Door and Threshold: 1/4 inch.

2.4 FABRICATION - FRAMES

A. General Requirements:
1. Provide frames based on door grade and model in accordance with ANSI/SDI A250.8 and HMMA 820.
2. Welded construction required; knocked-down not acceptable.
3. Fully face weld corners, including stops. Grind weld smooth with adjacent surfaces.
4. Corners of mitered design; stops coped and butted, or mitered.
5. Accurately cope joints of mullions, rails, and other similar tubular members; reinforce joints with concealed clips or sleeves.
6. Closed or tubular members may be fabricated of two pieces if interlocked at base of stops; visible seams or joints are not acceptable.

B. Guard Box:
1. Closed box design, 26 gage or 0.016 inch thick minimum, welded to frame.
2. Required at mortise hardware cutouts for assemblies installed within masonry walls or where assemblies will have frames grouted with mortar or similar materials at time of installation.

C. Spreader: Manufacturer's standard temporary channel or angles tack welded at bottom of jamb members.

D. Floor Anchor Clips:
1. Provide at each jamb and mullions which extend to floor.
2. In areas where concrete topping or other similar construction occurs, provide adjustable design to permit securing to depressed subfloor construction. In lieu of adjustable design, frames may extend to subfloor.

E. Jamb Anchors: Comply with SDI-111 and HMMA 820.
1. Masonry Walls: 3/16 inch diameter crimped galvanized wire or corrugated steel T-strap design. Locate near bottom of frame, near top of frame, and 32 inch centers maximum intermittently, minimum 3 per jamb.
2. Metal Stud Wall Systems: Steel clips welded to frame, type or design compatible with stud system. Locate at top of frame, 12 inch from top, and 24 inch centers maximum intermittently, minimum 4 per jamb.
3. Previously Placed Concrete, Masonry, or Structural Steel: Tension plate and spacer design, welded to frame at approximately 24 inch centers, minimum 3 per jamb. Frames drilled and countersunk for 1/4 inch flathead anchor bolts, set below frame surface.
4. Label Frames: Comply with fire testing agency label and listing requirements.

F. Silencers:
1. Drill or Punch Frames for Silencers. Coordinate hole size with silencers specified in Section 087100.
2. Single Interior Doors: 3 at strike jamb.

3. Pair of Interior Doors: 2 at header.
4. Weatherstripped doors: None required.
5. Sound, Light, or Smoke Sealed Doors: None required.
6. Transom Panels: 2 at each jamb.

G. Glazing Beads:
1. Minimum 18 gage or 0.042 inch thick steel, screw-on type, corners butted or mitered, secure with countersunk oval head screws at 12 inch centers maximum, and factory installed prior to shipment.
2. Place glazing bead on interior or non-secure side of frame.
3. Coordinate dimensions for glazing rabbets with requirements of Section 088000.

2.5 FABRICATION - DOORS

A. Flush Doors:
1. ANSI/SDI Level 2 and Physical Performance Level B, Heavy Duty, Model 1 (1-3/4 inch thick, 18 gage or 0.042 inch thick face sheets, Full Flush Design)
2. Option: Custom doors complying with NAAMM Standard HMMA 861 "Type A" may be used in lieu of standard doors constructed in accordance with SDI standards.
3. Core:
   a. Interior: Resin impregnated kraft paper honeycomb.
   b. Exterior: Manufacturer's standard insulated core.
   c. Fire rated Assemblies: Mineral fiber board.
4. Face sheets broken to form and meet in joint on stile edges.
5. Vertical edges continuously reinforced from top to bottom with steel channels or flat bars placed immediately inside of face sheets.
6. Reinforce top and bottom edge full width of door with steel channel not less than 16 gage or 0.053 inch thick.
7. Fabricate exterior doors with top edge closed flush and fabricate bottom edge with flush closure where required for attachment of weatherstripping. Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.
8. Provide insulating material in void spaces for sound deadening in assemblies utilizing internal core of steel stiffeners.
9. Fill face welds and surface depressions with metallic paste filler or body putty, grind smooth and flush to unblemished finish appearance.
10. Bevel lock or latch edge 1/8 inch in 2 inches at single doors and at meeting stiles at pairs of doors.

B. Glazing Beads:
1. Minimum 18 gage or 0.042 inch thick steel, screw on type, corners butted or mitered, welded to door assembly on security side, removable on opposite side.
2. Factory install and secure loose bead with countersunk oval head screws spaced 8 inch centers maximum and within 2 inches of ends.
3. Coordinate dimensions for glazing rabbets with requirements of Section 088000.

C. Vision Openings:
1. Frame openings for sizes indicated.
2. Provide fire-rated doors with code complying fire rated and impact rated glazing.
3. Equip with glazing beads.

D. Astragals:
1. Full height overlapping design, applied on in-active leaf at pairs of interior label doors as necessary to meet label requirements, minimum 20 gage or 0.032 inch thick steel.
2. Full height overlapping design at pairs of exterior doors, welded on active leaf, 1-3/4 inch by 12 gage or 0.093 inch thick steel.

2.6 FINISHES

A. Ferrous and Galvanized Steel Assemblies:
1. Clean surfaces free of mil scale, rust, oil, grease, dirt, and other foreign materials.
2. Phosphatize or chemically treat surfaces before application of prime coat finish.

3. Touch-up areas where abrasions and welding have destroyed zinc coating with zinc-rich paint before application of prime coat finish.
4. Prime Coat: Manufacturer's standard rust inhibitive primer to produce smooth and uniform coat.

2.7 ACCESSORIES

A. Cement Grout: Portland cement, sand and water; with minimum compressive strength of 3000 psi at seven days.

B. Bituminous Paint: Zero VOC Coal Tar Epoxy, Progressive Epoxy Polymers or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 INSTALLATION

A. Install hollow metal assemblies in accordance with SDI 105 and HMMA 840.

B. Comply with NFPA 80 for fire rated assemblies.

C. Set frames plumb, level, in true alignment, securely fastened to floor with expansion shields and bolts, and fastened to adjoining walls with specified jamb anchors. Remove temporary spreaders and braces.

D. Grouted Frames:
1. CMU Walls:
   a. Fully grout frames unless noted otherwise.
   b. Coat inside of frames with bituminous paint.

E. Fill face of countersunk flathead frame anchors with metallic paste filler; grind smooth and flush with frame surface.

F. Install doors accurately in frames maintaining specified clearances. Install hardware in accordance with manufacturer's written instructions and associated templates. Refer to Section 087100 for hardware installation requirements.

G. Install glass in accordance with Section 088000.

3.3 ADJUSTMENTS

A. After installation of hardware, test and adjust doors for smooth operation.

END OF SECTION

SECTION 081400

WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 081100 - Metal Doors and Frames.
   2. Section 087100 - Door Hardware.
   3. Section 099000 - Paints and Coatings: Field finishing.

B. This project is a registered US Green Building Council "LEED" project.
   1. Composite wood and agri-fiber products must contain no added urea-formaldehyde resins.
   2. Wood framing and blocking shall be certified according to the guidelines of the Forest Stewardship Council.
   3. Use of "certified wood" means use of minimum of 50 percent of wood-based materials certified in accordance with the Forest Stewardship Council (FSC) Guidelines for wood building components, including but not limited to framing materials, wood blocking, curbs, cants, nailers, furring, grounds, pedestrian barriers, concrete formwork, and equipment backing boards.
   4. Select core board materials to maximize use of rapidly renewable materials.
   5. Composite wood and agri-fiber products must contain no added urea-formaldehyde resins.
   6. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with LEED and Cal-GREEN Formaldehyde Limits requirements.
   7. Adhesives shall meet or exceed the VOC and chemical component limits of SCAQMD and Cal-GREEN VOC Limit requirements.
   8. Select locally or regionally fabricated products (within 500 miles of jobsite) wherever possible.

1.2 SYSTEM DESCRIPTION

A. Regulatory Requirements:
   1. Fire rated assemblies: Conform to NFPA 80 and 252, and UL 10B, and UL 10C (positive pressure).
   2. Installation of fire rated assemblies: Conform to NFPA 80 for fire rated class indicated.

B. Fire Ratings Compliance: Fire-rated wood doors to comply with NFPA-80 requirements according to building code standards having local jurisdiction.
   1. Neutral Pressure Testing - UBC 43-2 or 7-2-94; or UL10B.
   2. Positive Pressure Testing UBC 7-2-97 or UL10C.
   3. Positive Pressure:
      a. UL 10-C – Fire Test: Category A.
      b. ASTM E2074 – Fire Test
         1) After 5 minutes into the test, locate neutral pressure plane at 40 inches above finished floor.

C. Comply with applicable provisions of Section 9 of *Architectural Woodwork Standards* (AWS), 1st Edition, October 2009, as adopted and published by Architectural Woodwork Institute and the Woodwork Institute.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data to indicate compliance with specified requirements.

C. Shop Drawings:
   1. Submit door schedule indicating opening identification number, door type, grade, size, thickness, swing, label requirements, and undercuts when applicable. Use same identification numbers as Contract Drawings.

2. Include door elevations indicating type of construction, stile and rail requirements, hardware blocking, stile finishing, provisions for vision panels when applicable, and other pertinent data.
3. Indicate prefitting and premachining requirements, including hardware locations.
4. Detail full size sections of vision panel moldings.

D. Samples:
1. Submit three 8 by 10 inches sample demonstrating expected color range for each wood veneer, stain, and finish combination.

E. Submit following Informational Submittals:
1. Manufacturer’s instructions.

F. Closeout Submittals:
1. Submit under provisions of Section 017800.
2. Warranty.

G. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide project materials cost data for the following materials. Provide separate data for each different manufacturer used:
   a. Wood Doors
2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
   a. Wood Doors
3. LEED Credit MRc7: Provide documentation certifying the percentage of wood based products harvested from a FSC forest.
   a. Wood
   b. Provide wood certification submittal documentation including chain-of-custody documentation for all wood based materials installed.
   c. Provide a spreadsheet of all wood based products used on the project highlighting certified wood based material and include calculations demonstrating that 50% of wood based materials are certified wood.
4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
   a. Adhesives and sealants.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish each type of door from one manufacturer, unless otherwise acceptable to Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Protect during transit, storage and handling to prevent damage, soiling and deterioration.

C. Comply with manufacturer's instructions and AWS requirements for care and handling of doors.

D. Deliver to site after wet construction operations are completed and dry, and building has reached average prevailing relative humidity.

E. Deliver components in manufacturer's original unopened protective covering or container, clearly marked with manufacturer's name, brand name, and identifying door opening number on covering.

F. Storage:
1. Store in clean, dry, well ventilated area protected from sunlight.
2. Avoid extreme heat, cold, dryness or humidity.
3. Store flat over level surface above floor on wood blocking.
4. Under bottom door and over top of stack; furnish plywood or corrugated cardboard for protection.

G. Handling: Do not drag doors across one another or across other surfaces.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Comply with manufacturer's written requirements under which products can be installed
   2. Condition doors to average prevailing humidity in installation area prior to hanging.

1.7 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Provide written warranty signed by official of door manufacturer, agreeing to repair or replace defective doors which have:
   1. Delamination in any degree.
   2. Warp or twist of 1/4 inch or more in any 42 by 84 inch plane of door face.
   3. Telegraphing of stile, rail or core through face to cause surface variation in excess of 1/100 inch in any 3 inch span.

C. Include hanging, installation of hardware and refinishing which may be required due to repair or replacement of defective doors.

D. Provide warranty for solid core doors for life of original installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable 5 Ply (PC-5) Door Manufacturers:
   1. Algoma Hardwoods, Inc., Algoma, WI.
   2. Eggers Industries, Two Rivers, WI.
   3. Marshfield DoorSystems (Formerly Weyerhaeuser), Marshfield, WI.
   4. VT Industries, Holstein, IA.

2.2 MATERIALS

A. Face Veneer:
   1. Grade: As required by AWS quality standard Grade A custom grade.
   2. Species: As selected or scheduled by Architect.
   3. Cut: As selected or scheduled.
   4. Matching:
      a. Book match; center balanced.
      b. Sequence match sets for pairs of doors for continuity of veneer and appearance.

B. Particleboard Core:
   1. Quality: ANSI A208.1, Grade 1-LD-2.
   2. Density for 5-ply doors: 32 lbs/ft^3.

C. Comply with Cal-GREEN Table 5.504.4.5 - Formaldehyde Limits for composite wood and agri-fiber products.

D. Adhesives: Type I waterproof and Type II water-resistant, product as recommended by door manufacturer.

E. Adhesives & Sealants: Only use adhesives and sealants [in the interior of the building] that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.
   1. Current requirement refers to the date on which the materials are installed in the building.
   2. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

2.3 FLUSH DOORS

A. General:
   1. Provide doors in accordance with *Architectural Woodwork Standards*, Section 9.
   2. Door thickness: 1-3/4 inch thick.
   3. Top and Bottom Rails: Solid or laminated hardwood.

4. Stiles:
   a. Solid, laminated, or veneered hardwood to match face veneer.
   b. Screw holding capacity: 600 lbf; 740 lbf for 45, 60, and 90 minute fire rated doors, ASTM D1037.
   c. Modified cleavage: 750 lbf, ASTM D143.
5. Crossband: 1/16 inch horizontal hardwood veneer or high-density hardboard.
6. Bonding Adhesive:
   a. Face Assembly: Type I, Type II for plastic laminate.
   b. Core Assembly: Type II.

B. 5 Ply Door:
1. Quality Standard: AWS PC-5, custom grade.
2. Construction: Face material and crossband bonded to each side of core.
3. Face Material:
   a. Wood veneer.
   b. Thickness: 0.020 inch minimum.
4. Core: Particleboard, glued to stiles and rails.
5. Fire Rating: 20 minutes where indicated.

2.4 ACCESSORIES

A. Metal Edge and Astragal: Cold rolled steel, 20 gage minimum.

2.5 FABRICATION

A. General:
1. Factory prefit to size ready for installation; trimming at Project site not permitted. Factory machine for mortised hardware.
2. Prepare factory prefit and premachined assemblies in accordance with approved frame shop drawings, hardware schedule, and templates.

B. Fabricating Tolerances:
1. Prefit size: Plus or minus 1/32 inch overall dimensions.
2. Squareness: Length of diagonal measured on face of door from upper right corner to lower left corner between length of diagonal measured on upper left corner to lower right corner with maximum difference of 1/8 inch.
3. Maximum warp: 1/4 inch in any 42 by 84 inch plane of door face.
4. Show-through (telegraphing): 0.010 inch deviation from true plane in any 3 inch span on door frame.

C. Fire Rated Assemblies:
1. Identify each assembly with factory applied label indicating applicable fire rating, fasten to hinge stile edge.
2. Stairway enclosures constructed for maximum temperature rise not to exceed 450 degrees F above ambient temperature at end of 30 minute fire exposure test with labels indicating this requirement.
3. Factory machine for mortised hardware. Drill screw holes with 9/64 inch pilot hole to accept No. 12 by 1-1/4 inch threaded-to-head screws.
4. Equip pairs of label doors with overlapping full height astragal and metal edges to meet label requirements; pre-drill for screws and premachine for specified hardware. Apply astragal on inactive leaf. Metal astragals and edges are not required on 20 minute paired doors with label and listed treated stiles.

D. Edge Clearance:
1. Between doors and frames at head and jambs: 1/8 inch.
2. Between meeting stiles at pairs of doors: 1/8 inch.
3. Between bottom edge and finished floor: 1/2 inch, except where larger undercuts are scheduled at non-fire rated assemblies.

E. Stile Edge Treatment:
1. Bevel strike stile of single doors and meeting stiles at pairs of doors 1/8 inch in 2 inches.
2. Bevel hinge stile of fire doors 1/16 inch in 2 inches.

F. Machining for Hardware:
   1. Factory machine for hardware requiring mortising and routing.
   2. Machining not required for surface mounted hardware.
   3. Prepare in accordance with applicable ANSI A115-W Series, except for hardware locations.
   4. Prepare in accordance with templates and approved hardware schedule.
   5. Pilot drill screw and bolt holes.
   6. Locate hardware in accordance with requirements specified in Section 087100.

2.6 FINISHING

A. Comply with *Architectural Woodwork Standards*, Section 5 for types of factory applied finish systems indicated.

B. Field finish assemblies; refer to Section 099000.

C. Seal top and bottom edges, vision panel cutouts, and mortised hardware cutouts using manufacturer's standard sealer.

D. Metal edges, metal vision panel frames, and astragals:
   1. Manufacturer's standard oven cured low luster enamel.
   2. Custom colors selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.
   1. Verify frames are properly sized and set square and true.

3.2 INSTALLATION

A. Install in accordance with Section 017300, approved shop drawings, and manufacturer's written instructions.

B. Install accurately in frame, within clearances specified. Install hardware in accordance with manufacturer's written instructions and associated templates. Refer to Section 087100 for general installation requirements.

C. Install doors to operate freely, but not loosely, free from hinge bound conditions, sticking, or binding. Do not install in frames which would hinder operation of doors.

D. Ensure doors are free from rattling when in latched position.

3.3 ADJUSTING

A. After installation of hardware, adjust and check each door to ensure proper operation and function.

B. Replace or rehang doors which are hinge bound and do not swing or operate freely.

C. Remove and replace doors which are warped, twisted or which are not in true planes.

D. Refinish or replace field finished doors damaged during installation.

3.4 CLEANING AND PROTECTION

A. Protect finished work in accordance with Section 017400.

B. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish.

END OF SECTION

SECTION 083100

ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Requirement of Products Covered Under This Section:
   1. Furnish and install access panels as required to access plumbing, fire protection, mechanical and electrical work as necessary for operation and maintenance of concealed equipment, valves, cleanouts, controls, and other similar devices requiring access.
   2. Custom sizes will be required. Coordinate requirements with Architectural Reflected Ceiling Plans, and Divisions 21, 22, 23, and 26.

B. Related Sections:
   1. Section 087100 - Door Hardware: Keyed cylinders.
   2. Section 099000 - Paints and Coatings: Field paint finish.
   3. Division 22 – Plumbing: Coordinate access panel location.
   4. Division 23 – Heating, Ventilating, and Air Conditioning: Coordinate access panel location.
   5. Division 26 – Electrical: Coordinate access panel location.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Provide stainless steel units at staff locker rooms.
   2. Determine specific locations and sizes for access doors and panels needed to gain access to concealed equipment, and indicate on schedule specified under “Submittals” Article.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for each type of access panel.

C. Shop Drawings: Include complete schedule indicating types, locations, sizes, wall and ceiling construction details, latching and locking provisions, and other pertinent data.

D. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
      a. Access Doors
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Access Doors
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Access Doors

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer to ensure quality of appearance and performance.

B. Fire-Resistance Ratings: Appropriate UL or Warnock Hersey label required on fire rated assemblies.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units which may vary from sizes indicated on Drawings.

D. Coordination: Furnish inserts and anchoring devices which required to be built into other work for installation of access panels. Coordinate delivery with other work to avoid delay.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Steel Manufacturers:
1. Bauco, Access Panel Solutions Inc.
2. J. L. Industries, Bloomington, MN.
3. Karp Associates, Inc., Maspeth, NY.
4. Milcor Incorporated, Lima, OH.
5. Nystrom Products Company, Minneapolis, MN.
6. The Williams Brothers Corporation of America, Front Royal, VA

2.2 MATERIALS AND FABRICATION

A. Steel Assemblies: Fabricate of sheet steel complying with ASTM A1008.

B. Stainless Steel Assemblies: Fabricate of sheet stainless steel complying with ASTM A167, Type 304 with No. 4 finish.

C. Frames:
1. Fabricate with casing bead welded to perimeter of frame for assemblies installed in gypsum board surfaces.
2. Fabricate of not less than 16 gage materials.
3. Fabricate with exposed flange of nominal 1 inch wide around perimeter for assemblies installed in following construction:
   a. Exposed masonry or concrete.
   b. Ceramic tile.
   c. Suspended ceiling, acoustical tile.
4. Fabricate with galvanized expanded metal lath and exposed casing bead welded to perimeter of frame for assemblies installed in full-bed cement plaster surfaces.

D. Non-Rated Flush Panels: Fabricate of not less than 14 gage sheet materials. Equip with concealed spring hinges or concealed continuous piano hinge designed to open 175 degree minimum.

E. Recessed Panels:
1. Frames:
   a. Fabricate of not less than 14 gage materials.
   b. Fabricate with casing bead welded to perimeter of frame for assemblies installed in gypsum board or plaster surfaces.
2. Non-Rated Recessed Panels:
   a. Fabricate recessed pan of 16 gage.
   b. Factory install gypsum board flush to door surface.
   c. Equip with concealed hinges.
   d. Basis of Design: Bauco
3. Non-Rated Exterior Rated Recessed Panels:
   a. Fabricate recessed pan of 16 gage.
   b. Door Recess: 1/2-inch and lined with self furring 3.4 lb. flat rib galvanized steel lath.
   c. Hinge: Concealed pivoting rod type.
   d. Spot weld brass sleeves to door to protect plaster around can and stud.
   e. Model DSC-210PL, KARP

F. Fire-Rated Flush Panels: Fabricate of with minimum 20 gage sheet materials of sandwich type construction with manufacturer's standard core. Equip with hardware, self-closing mechanism, and interior latch release mechanism.

G. Locking Devices: Provide flush, screwdriver-operated cam locks of number required by manufacturer to hold panel in flush, smooth plane when closed.

H. Locking Devices at Exterior: Provide key operated cylinder lock with automatic dust shutter.

2.3 FINISH

A. Steel Assemblies:
   1. Clean surfaces free of mil scale, rust, oil, grease, dirt, and other foreign materials.
   2. Phosphatize or chemically treat surfaces before application of prime coat finish.
   3. Apply rust inhibitive primer to produce uniform smooth coat at [(2.0 mils)] minimum dry film thickness.

B. Stainless Steel Assemblies:
   1. No. 4 finish complying with NAAMM AMP503, vertical grain.
   2. Protect finish with factory applied adhesive backed paper covering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify rough openings are correctly located, sized and prepared for installation.

3.2 INSTALLATION

A. Install plumb, level, square and rigidly secured in accordance with Section 017300.

B. Position for convenient access to concealed work requiring access.

C. Remove protective paper from stainless steel assemblies. Clean surfaces free of residue and polish to uniform luster.

3.3 ADJUSTMENTS

A. After installation, test and adjust panels and hardware for smooth operation.

END OF SECTION

SECTION 083323

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 087100 - Door Hardware: Cylinders for keyed control stations.
   2. Section 099000 - Painting: Field paint finish.
   3. Division 26 - Electrical: Electrical service.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Manufacturer is responsible for designing units, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Refer to Section 014450 for wind load requirements.

B. Interface with Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections for structural members in installation.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data , wiring diagrams, and rough-in requirements.

C. Shop Drawings:
   1. Submit drawings for components and installations which are not fully dimensioned or detailed on manufacturer's literature.
   2. Stamp shop drawings with seal and signature of professional engineer responsible for design.

D. Submit following Informational Submittals:
   1. Support reactions design data.
   2. Certifications specified in Quality Assurance article.
   3. Manufacturer's instructions.

E. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Operation and maintenance data.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Overhead Coiling Doors
   2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Overhead Coiling Doors
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Overhead Coiling Doors

1.4 QUALITY ASSURANCE

A. Certifications:
   1. Submit certificates verifying AWS qualifications for each welder employed on Project.
   2. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
   3. Engineering certifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. The Cookson Company, Phoenix, AZ.
   2. Cornell Iron Works, Inc., Mountaintop, PA.
   3. The Overhead Door Corporation, Dallas, TX.
   4. The McKeon-Wilson Rolling Steel Door Company, Brooklyn, NY.

2.2 MATERIALS

A. Steel: Maximize use of recycled steel with minimum of 30 percent.

B. Sheet Steel: Hot-dipped galvanized steel complying with ASTM A653, G90 zinc coating.

C. Steel Shapes and Plates: ASTM A36.

D. Gray Iron Castings: ASTM A48, Class 30B.

E. Primer: Manufacturer's standard coating.

2.3 COMPONENTS AND FABRICATION

A. Curtains:
   1. Slats: Formed interlocking flat, perforated sections, nominal 3 inch height, fabricated of galvanized sheet steel, continuous length for full width without splices.
   2. Gage: As recommended by manufacturer for size of opening and engineered to withstand design wind loads.
   3. Endlocks:
      a. Designed to act as wearing surface in guides and to prevent lateral movement.
      b. Provide on ends of alternate slats for non-rated assemblies.
   4. Bottom of Curtain: Reinforced with back to back galvanized steel angles and equipped with neoprene weather seal for constant contact with floor in closed position.

B. Curtain Guides:
   1. Steel angles, channels or formed sections of required sizes and configurations, 3/16 inch minimum thickness.
   2. Equip with windlock bars engineered to withstand design wind loads.
   3. Extend wall angles above header of opening to support coil brackets.

C. Roller Shaft Counterbalance Mechanism:
   1. Steel pipe and helical steel spring system capable of producing sufficient torque to ensure easy operation of curtain from any position.
   2. Adjustable spring tension design accessible from outside end brackets.
   3. Equip with sealed ball or roller bearings at rotating supports.

D. Brackets: Manufacturer's standard design, either cast iron or steel plate, secured to guide extensions and designed to support counterbalance assembly.

E. Hood:
   1. Galvanized sheet metal, 24 gage minimum.
   2. Internally reinforced to maintain rigidity and form.
   3. Provide intermediate support brackets as necessary to prevent sag.

F. Seals: Equip exterior assemblies with neoprene or vinyl weather seals at curtain guides and in hood.

G. Limit Switches:
1. Provide limit switches designed to indicate when curtains are in closed position.
2. Conduit, wiring and connections to security system are specified under Division 26 - Electrical.

2.4 MANUAL OPERATORS

A. Chain Operator:
1. Continuous steel hand chain with gear reduction, maximum pull 35 pounds.
2. Equip with self-locking mechanism allowing curtain to be stopped at any point and remain in position until movement is reactivated.

2.5 MOTOR OPERATORS

A. Operators:
1. Size and capacity recommended by door manufacturer; wall or bracket mounted.
2. Complete with internal prewiring to terminal block, electric motor, controller, gear reduction unit, solenoid operated brake, adjustable clutch, control devices and 24 volt circuit control stations.
3. Worm gear drive from motor to reduction gear box and chain or worm gear drive from reduction box to gear mounted on counterbalance shaft.
4. Designed for removal of motor without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
5. Coordinate with building access card reader system to allow after-hour operation for access and egress from garage.

B. Electric Motors:
1. High-starting torque, reversible, constant duty, Class A insulated with overload protection, sized to move curtain in either direction, from any position, at approximately one foot per second.
2. Motor Size: As recommended by manufacturer for circumstances.
3. Coordinate wiring requirements and current characteristics with electrical service system.

C. Emergency Auxiliary Operator:
1. Provide hand chain or crank for emergency manual operation in case of power failure or other similar events.
2. Provide hand operated or automatic mechanism to engage sprocket of auxiliary operator and release brake.
3. Include interlock device to automatically prevent motor from operating when auxiliary sprocket is engaged.

D. Local Control Stations:
1. Interior: Surface mounted, momentary contact, 3 button design with push buttons labeled "open", "close" and "stop", fully guarded and NEMA Type 1 enclosure.
2. Provide interfacing devices and other necessary accessories for control from incoming vehicles.
3. Exiting: Key controlled.

E. Automatic Reversing Control:
1. Provide at each motor operated assembly.
2. Electro-mechanical type, 24 volt circuit, full width at bottom of curtain.
3. Designed to reverse closing action upon striking an object and return curtain to fully opened position.
4. Connect to control circuit through retracting safety cord and reel, or self-coiling cable.

2.6 FINISH

A. Curtain and Hood:
1. Chemically treat and bonderize.
2. Apply shop coat of manufacturer's standard primer.

B. Other Exposed Surfaces: Manufacturer's standard primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify that openings are prepared with headers level, jambs plumb, floor level, without projections, and correctly dimensioned to receive assemblies.

3.2 INSTALLATION

A. Install assemblies and operating equipment complete with operators, controls, and related accessories in accordance with Section 017300 and approved shop drawings.

B. Coordinate installation with electrical service.

C. Upon completion of installation, including work by other trades, test and adjust curtains to operate easily, free from warp, twist or distortion.

D. Clean surfaces, joints and bearings of unit in accordance with manufacturer's instructions; lubricate as recommended by manufacturer.

END OF SECTION

SECTION 083483

ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. System Description: Smoke Containment System with reinforced polyamide smoke containment curtain, control station, metal housing, rewind switch, cove bases, and accessories as required for complete, operational installation.

B. Work by Others shall be completed prior to installation of Smoke Containment System.

1.2 RELATED WORK

A. Electrical
1. Smoke Detector with normally open auxiliary contact and emergency power supply.
2. 120v AC Power and connection to Control Station.
3. Pull box, conduit, and wire for Control Circuit.
4. Pull box, conduit, and wire for Alarm Circuit.
5. Pull box, conduit, and wire for Housing Control Circuit.
6. Pull box, conduit, and wire for Rewind and Battery Charge Indicator.
7. J-Boxes and Access Panels as required.

B. Framing
1. Housing mounting area flush with hoistway wall above hoistway door.
2. Plumb and square hoistway door frame.
3. Metal backing in new shaft wall construction in container mounting area.
4. Level floor between hoistway doorframes.

C. Painting
1. Paintable silicone sealant at perimeter of auxiliary rails, cove bases, and housing.
2. Field paint per Section 099000.

1.3 REFERENCES

A. ASTM A240/240M – Standard Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.

B. ICC Evaluation Service ES AC77 – Acceptance Criteria for Smoke-Containment Systems Used With Fire-Resistive Elevator Hoistway Doors and Frames.

C. ICC Evaluation Service report ESR-1136

D. NFPA Codes and Standards:
1. 70 – National Electrical Code.
2. 105 – Recommended Practice for the Installation of Smoke-Control Door Assemblies.
3. 72-2002 and 2007 – National Fire Alarm Code

E. International Building Code
1. 2003 – Sections 715.3 and 715.3.3.
2. 2006 – Sections 715.4.3.1 and 715.4.

F. UL Standards:
1. 268 – Smoke Detectors for Fire Protective Signaling Systems.
2. 508 – Industrial Control Equipment.
3. 864 – Control Units for Fire Protective Signaling Systems.
4. 1784 – Air Leakage Tests for Door Assemblies.

1.4 SYSTEM REQUIREMENTS

A. Air Leakage: Not to exceed 3 cfm per sf of door opening at 0.1 in water pressure differential at ambient temperature and 400 degrees F tested per IBC 2000 714.2.3.

B. Maximum Size: The maximum LISTED width is 4"-0" inside doorframe. The maximum mounting height is 9'-0". Oversized units shall be available upon request.

C. Maximum Temperature Necessitating Replacement: The smoke containment system must be replaced after exposure to temperatures exceeding 200 degrees F.

D. Product Recognition
   1. Each smoke-containment system shall be identified as follows:
      a. The Manufacturer's name.
      b. Maximum leakage rating at the specified pressure and temperature conditions.
      c. Label of the approved quality control agency.
      d. ICC Evaluation Service Report ESR-1136.
      e. City of Los Angeles approval number.

1.5 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Submit Manufacturer's complete product data and installation instructions

C. Shop Drawings: Indicate the following on the shop drawing submittal:
   1. Anticipated Date of Installation.
   2. Elevator lobby ceiling height.
   3. Hoistway door opening width.
   4. Hoistway door opening height.
   5. Hoistway doorframe profile, projection from finished wall and face width.
   6. Hoistway doorframe material and existing finish.
   7. Mounting height.
   8. Any projections or obstacles from lobby wall within 12 inch of hoistway doorframe, floor to ceiling.

D. Cycle Testing: Before smoke containment systems are placed into use, perform acceptance tests as required and recommended by the Manufacturer and the Authority Having Jurisdiction.

E. Permits and Manuals:
   1. Furnish certificates, operating permits, maintenance manuals with operating and maintenance instructions, emergency information, and similar information to Owner as required.
   2. Instruct Owner's personnel in proper operation and required semi-annual maintenance.

1.6 QUALITY ASSURANCE

A. Overall Standards: Manufacturer shall maintain a quality control program in accordance with ICC-ES Acceptance Criteria 77.

B. Qualifications:
   1. Manufacturer Qualifications: Minimum seven years experience in producing smoke containment systems of the type specified.
   2. Installer Qualifications: Factory trained by manufacturer.

C. Certifications:
   1. Manufacturer’s ICC Evaluation Service report ESR-1136.
   2. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing.
   3. Testing Laboratory Label.
   4. UL Listing.

D. Pre-Installation Meeting:
   1. Schedule and convene a pre-installation meeting prior to commencement of field operations with representatives of the following in attendance: Owner, Architect, General Contractor, smoke containment system sub-contractor, painting sub-contractor, and electrical sub-contractor.
   2. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures, and protection measures.
   3. Keep minutes of meeting including responsibilities of various parties and deviations from specifications and installation instructions.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Follow manufacturer's instructions.

1.8 MAINTENANCE

A. Maintenance and Testing:
   1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer's warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
   2. Backup Battery: Test semi-annually during warranty period.
   3. Provide test documentation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Model M400, Smoke Guard Corporation, Boise, Idaho.

2.2 MATERIALS

A. Screen:
   1. Film: Minimum 1 mil thick transparent polyimide film reinforced with minimum 100 denier Nomex yarn at 0.25 in each way.
   2. Magnetic Strips: Flexible multi-pole strips attached to longitudinal edges of film with low modulus silicone adhesive.

B. Housing: 20 gage, powder coated, cold rolled steel container with dust cover and door with concealed hinges. Housings are 55, 64, or 73" in length plus 1-1/2 inches for a junction box on the left side.

C. Auxiliary Rails for Non-Ferrous Frames:
   1. Material: 16 gage ASTM A 240/240M, Type 430, ferritic stainless steel.
   2. Size: 2 inches wide; depth as required to project beyond face of elevator door frame, as shown in Shop Drawings.

D. Rewind Motor: NFPA 70, 90v DC.

E. Release Mechanism: Comply with UL Standard No. 864.

F. Screen Rewind Switch: Include switch to rewind screen into housing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.
   1. Verify related work performed under other sections is complete and in accordance with Shop Drawings.
   2. Verify wall surfaces and elevator door frames are acceptable for installation of smoke containment system components.
   3. Verify existing field painted elevator door frames to be used for screen adherence have been repainted in accordance with smoke containment system manufacturer's instructions or they have the original factory paint.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

C. Commencement of work by installer is acceptance of substrate.

3.2 INSTALLATION

A. Comply with requirements of Section 017300.

B. The smoke-containment system shall be installed in accordance with manufacturer's written instructions for a complete, rated system by factory trained Installers.

3.3 FIELD QUALITY CONTROL

A. Field Test: Follow manufacturer's cycle test procedures.
   1. Notify Owner's Representative, local Fire Marshal, alarm sub-contractor and elevator sub-contractor minimum one week in advance of scheduled testing.
   2. Complete maintenance service record.

3.4 DEMONSTRATION

A. Demonstrate required testing and maintenance procedures to Owner's Representative.

B. Maintenance and Testing:
   1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer's warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
   2. Retain permanent record of tests.

C. Future Painting: Paint elevator door frame and/or auxiliary rails in accordance with Operation and Maintenance Manual.

D. Qualified Smoke Guard Inspector assesses unit(s) after exposure to a fire event.

END OF SECTION

SECTION 084113

ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Entrance and storefront systems, complete with reinforcing, sill extrusions, fasteners, anchors, and attachment devices.
2. Aluminum doors complete with hardware.
3. Accessories necessary to complete work.

B. Related Sections:
1. Section 079200 - Joint Sealants: Perimeter sealants and backup materials.
2. Section 087100 - Door Hardware: Keyed cylinders.
3. Section 088000 - Glass and Glazing.

C. This Project is a registered US Green Building Council “LEED” project.
1. Select materials to maximize use of recycled aluminum.
2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM REQUIREMENTS

A. General: In addition to requirements shown or specified, comply with design requirements of Section 014450.

B. Design Requirements:
1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of storefront system.
3. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
4. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
5. Structural silicone glazed framing system for two-sided silicone glazing of glass to aluminum back-up framing at intermediate members; fully framed around perimeter.
6. Provide concealed fastening wherever possible.
7. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
8. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
9. Anchors, fasteners and braces shall be structurally stressed not more than 50 percent of allowable stress when maximum loads are applied.
10. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
11. Assemblies shall be free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
12. Anticipated Live Load Interior Beam Deflections: 1/360 of beam length.
13. Stresses placed on structural silicone sealants shall be kept within sealant manufacturer's recommended maximum.

C. Thermal Requirements:
1. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180 degrees F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.
2. Ensure doors function normally within limits of specified temperature range.

3. Deflection: Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures shall not exceed 1/175 of its clear span or 3/4 inch, whichever is less , except that maximum deflections of members supporting plaster surfaces shall not exceed 1/360 of its span.

D. Testing Requirements: Provide components that have been previously tested by an independent testing laboratory.

E. Structural Silicone Assembly Performance:
1. Ensure structural silicone has ultimate strength which provides minimum safety factor of 3 compared to applied loads.
2. Ensure allowable tension and shear stress in structural silicone does not exceed 20 psi, or less if required by sealant manufacturer or by structural silicone substrate tests. A 1/3 increase for wind and seismic load is not permitted.
3. Force per linear inch generated by 3 times applied load must be transmitted without failure of paint films, insulated glass edge seals, glass coatings, and other elements in line of stress. Dead weight of vertical glass to be carried by structural silicone.
4. Adhere structural silicone to specially prepared surfaces and verify minimum safety factor by adhesion tests.
5. Do not adhere structural silicone to mill finish aluminum surfaces.

F. Interface With Adjacent Systems:
1. Integrate design and connections with adjacent construction.
2. Accommodate allowable tolerances and deflections for structural members in installation.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
1. Submit product data for storefront system.
2. Include information for factory finishes, hardware, accessories and other required components.
3. Include color charts for finish indicating manufacturer's standard colors available for selection.

C. Shop Drawings:
1. Submit shop drawings created by storefront manufacturer covering fabrication, installation, and finish of specified systems.
2. Stamp shop drawings with seal and signature of professional engineer responsible for design.
3. Include following:
   a. Fully dimensioned plans and elevations with detail coordination keys.
   b. Locations of exposed fasteners and joints.
4. Provide Detailed Drawings of:
   a. Composite members.
   b. Joint connections for framing systems and for entrance doors.
   c. Anchorage.
   d. System reinforcements.
   e. Drainage patterns and sill extrusions.
   f. Expansion and contraction provisions.
   g. Hardware, including locations, mounting heights, reinforcements and special installation provisions.
   h. Glazing methods and accessories.
   i. Internal sealant requirements and recommended types.
   j. Thermal breaks.
5. Schedule of finishes.

D. Samples:
1. Submit samples indicating quality of finish in required colors on alloys used for work, 12 inches long for extrusions and 6 inches square for sheet materials.

2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.

E. Submit following Informational Submittals:
1. Test Reports:
a. Standard Systems: Submit certified copies of previous test reports substantiating performance of system in lieu of retesting. Include other supportive data as necessary.
2. Support reactions design data.
3. Certifications specified in Quality Assurance article.
4. Qualification Data: Manufacturer's, engineer's, and installer's qualification data.
5. Manufacturer's installation instructions. Include detailed instructions describing each step of reglazing procedures.

F. Closeout Submittals:
1. Submit under provisions of Section 017800.
2. Warranty: Submit specified warranty.

G. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
a. Framing Materials and Accessories.
2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
a. Framing Materials and Accessories.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
a. Framing Materials and Accessories.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:
1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.

B. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of storefront systems.

C. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

D. Certifications:
1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
2. Submit manufacturer's certificate stating that sealed insulating glass meet or exceed specified requirements.
3. Submit coating manufacturer's certification stating fluoropolymer coating formulation is fluorosurfactant complying formulation.
4. Engineering certifications.
5. Submit certification stating compatibility of insulating glass sealant with silicone glazing sealant.
6. Submit certification stating acceptance of installation procedures signed by glass manufacturer, sealant manufacturer, and systems manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Protect finished surfaces as necessary to prevent damage.

C. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.

D. Do not leave coating residue on any surfaces.

E. Replace damaged units.

1.6 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Provide written warranty jointly signed by manufacturer, installer and Contractor agreeing to repair and/or replace assemblies which fail in material or workmanship during warranty period of 5 years from date of Substantial Completion.

C. Provide written warranty stating organic coating finish will be free from fading more than 10 percent, chalking, yellowing, peeling, cracking, pitting, corroding or non-uniformity of color, or gloss deterioration beyond manufacturer's descriptive standards for 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Entrance and Storefront Manufacturers:
   1. Arcadia, Inc., Vernon, CA.
   2. EFCO Corporation, Monett, MO.
   3. Kawneer Company, Inc., Norcross, GA.
   4. Oldcastle Building Envelope, Santa Monica, CA.

B. Acceptable Entrance and Storefront Products:
   1. Storefront and Entrance Framing Systems:
      a. Profile: Thermally broken, offset glazed with silicone joints where indicated, profile as detailed on the Drawings.
      b. Basis of Design: Arcadia TC970 series.
   2. Entrance Doors: Profile as detailed on the Drawings.

2.2 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum:
   1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.
   2. Minimum thickness of 0.125 inch for framing members and rails, 0.090 inch for sheets, and 0.050 inch for glazing stops and similar components.
   3. Provide aluminum with 20% minimum post-consumer recycled content.

B. Internal Reinforcing:
   1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
   2. Shapes and sizes to suit installation.
   3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645, applied after fabrication.

C. Anchorage Devices:
   1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
   2. Hot-dip galvanize steel assemblies after fabrication, comply with ASTM A123, 2.0 ounce minimum coating.
   3. Self-Drilling, Self-tapping Fasteners: Elco Dril-Flex with Stalgard Finish; no substitutions.

D. Fasteners:
   1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
   2. Provide concealed fasteners wherever possible.
   3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
   4. For concealed locations, provide manufacturer's standard fasteners.

E. Self-Drilling, Self-tapping Fasteners: Elco Dril-Flex with Stalgard Finish; no substitutions.

F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641.

H. Glazing Gaskets:
1. Compression type design, replaceable, molded or extruded, of material compatible with silicone.
2. Conform to ASTM C509 or C864.
3. Profile and hardness as required to maintain uniform pressure for watertight seal.

I. Setting Blocks:
1. Type: Meet requirements of ASTM C864, preformed silicone, compatible with glazing sealants and seals of insulating glass.
2. Hardness: 80-90 Shore "A" durometer.
3. Size: Length equal to 0.1 inch for each square foot of glass, but not less than 4 inch by width 1/16 inch less than channel by sufficient height to provide minimum edge clearance of glass.

J. Edge (Anti-Walk) Blocks:
1. Type: Meet requirements of ASTM C864, preformed silicone, compatible with glazing sealants and seals of insulating glass.
2. Hardness: 60-70 Shore "A" durometer.
3. Size: Minimum 4 inch length by width to support thickness of glass, allow nominal 1/8 inch clearance between edge of glass and block.

K. Spacers (Shims):
1. Type: Meet requirements of ASTM C864, preformed silicone, compatible with glazing sealants, self-adhesive one face.
2. Hardness: 50-60 Shore "A" durometer.
3. Size: Minimum 3 inch length by one-half height of glazing stop by thickness to suit application.

L. Continuous Spacer Gaskets: Preformed silicone, Shore A hardness and size recommended by structural glazing sealant manufacturer.

M. Glazing Sealants:
1. Type: Silicone, one-part, neutral cure, conforming to ASTM C920, Type S, Grade NS.
2. Colors: As selected by Architect from full range of manufacturer's standard colors.
3. Primer: When required by sealant manufacturer, type as recommended.
4. Acceptable products (glass to glass weather seal):
   a. 795 Silicone Building and Glazing Sealant, Dow Corning Corporation, Midland, MI.
   b. Silglaze II, General Electric Silicones, Waterford, NY.
5. Acceptable products (glass to metal structural adhesion):
   a. 995 Silicone Building Sealant, Dow Corning Corporation, Midland, MI.
   b. Ultraglaze SSG 4400 Silicone Structural Glazing Adhesive, General Electric Silicones, Waterford, NY.
6. Adhesives and sealants shall comply with VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

N. Weatherstripping:
1. Wool pile conforming to AAMA 701.2; or extruded elastomeric conforming to ASTM C509 or C864.
2. Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.

O. Internal Sealants and Baffles: Types recommended by systems manufacturer.

2.3 DOOR HARDWARE

A. Hardware:
1. Receive hardware supplied in accordance with Section 087100.
2. Cut, reinforce, drill and tap frames and doors as required to receive hardware.
3. Comply with hardware manufacturer's templates and instructions.
4. Use concealed fasteners wherever possible.
5. All hardware edges shall have eased edges. Provide door hardware with smooth edges only.

2.4 FABRICATION

A. Coordination of Fabrication:
1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
2. Fabricate units to withstand loads which will be applied when system is in place.

B. General:
1. Provide each unit of framework continuous.
2. Disassemble only to extent necessary for shipment and installation.
3. Conceal fasteners wherever possible.
4. Reinforce work as necessary for performance requirements, and for support to structure.
5. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators which will prevent contact and corrosion.
6. Comply with Section 088000 for glazing requirements.

C. Aluminum Framing:
1. Provide members of size, shape and profile indicated, designed to provide for glazing from exterior.
2. Provide manufacturer's standard thermal isolation between exterior and interior aluminum extrusions.
3. Fabricate frame assemblies with mitered or coped joints.
4. Reinforce to develop full strength and maximum rigidity in framework.
5. Reinforce internally with structural members as necessary to support design loads.
6. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
7. Seal horizontals and direct moisture accumulation to exterior.
8. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
9. Fabricate framing for expansion and contraction due to temperature changes without detrimental to appearance or performance.
10. Make provisions in framing for minimum edge clearance, nominal edge cover and nominal pocket width for thickness and type of glazing or infill used in accordance with recommendations of manufacturer and GANA Glazing Manual.

D. Entrance Doors:
1. Narrow stile with manufacturer's standard features except provide 10 inch high bottom rail, except provide welded joints.
2. Fabricate with mechanical clips and welded joints. Tie-rods not acceptable.
3. Provide extruded aluminum glazing stops of square design, permanently anchored on security side and removable on opposite side.

E. Hardware:
1. Receive hardware supplied in accordance with Section 087100 and install in accordance with requirements of this Section.
2. Cut, reinforce, drill and tap frames and doors as required to receive hardware.
3. Comply with hardware manufacturer's templates and instructions.
4. Use concealed fasteners wherever possible.

F. Welding:
1. Comply with recommendations of the American Welding Society.
2. Use recommended electrodes and methods to avoid distortion and discoloration.
3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

2.5 FINISH

A. Fluoropolymer Coating:
1. Comply with AAMA 2605.
2. Resin: 70 percent polyvinylidene fluoride (PVDF).
3. Substrate: Cleaned and pre-treated.
4. Primer:
   a. Coating: Manufacturer’s standard resin based compatible coating.
   b. Dry Film Thickness: Minimum 0.20 mil.

5. Topcoat:
   a. Coating: PVDF.
   b. Dry Film Thickness:
      1) Coil: 0.80 mil.
      2) Extrusion: 1.0 mil.
6. Color: As selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 INSTALLATION

A. Erection Tolerances:
   1. Limit Variations from Plumb and Level:
   2. 1/8 inch in 10'-0" vertically.
   3. 1/8 inch in 20'-0" horizontally.
   4. Limit Variations from Theoretical Locations: 1/4 inch for any member at any location.
   5. Limit Offsets in Theoretical End-To-End and Edge-To-Edge Alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.

B. Set units plumb, level and true to line, without warp or rack of frame.

C. Anchor securely in place, allowing for required movement, including expansion and contraction.

D. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.

E. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weathertight construction.

F. Glazing:
   1. Install glazing gaskets and sealants in accordance with manufacturer's instructions without exception, including surface preparation.
   2. Ensure bonding surfaces are sound, clean, dry and free of contamination which would affect bonding strength.
   3. Clean glass edges and surfaces in contact with glazing sealant with cleaner recommended by manufacturer.
   4. Provide setting blocks, edge blocks, and spacers of proper size to support and hold glass in position independent of glazing gaskets. Comply with placement recommendations of GANA Glazing Manual.
   5. Arrange setting blocks, edge blocks and spacers to avoid blocking water transfer inside frames.
   6. Set glass properly centered with uniform bite, face clearance and edge clearance, free from twist, warp or other distortion likely to develop stress.
   7. Handle and install glass in accordance with manufacturer's directions.
   8. Prevent nicks, abrasion and other damage likely to develop stress on edges.
   9. Do not field cut tempered or insulating glass.
   10. Mask areas adjacent to joints if necessary to obtain neat sealant line.
   11. Tool sealant concave and promptly remove masking tape.
   12. Clean excess sealant from adjacent surfaces while in uncured stage with recommended solvent.

G. Install doors and hardware in accordance with manufacturer's printed instructions.

3.3 FIELD QUALITY CONTROL

A. Site Tests: Comply with requirements of Section 014450.

B. Perform Hose Test in accordance with Section 014450.

3.4 ADJUSTING

A. Test Door Operating Functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.5 CLEANING

A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.

B. Clean metal surfaces exercising care to avoid damage.

C. Remove adhered matter and excess sealant materials.

D. Wash glass on interior and exterior to remove paint, soil, prints and foreign matter. Clean glass only with mild detergent and water following glass manufacturer's instructions. Do not use abrasive materials.

END OF SECTION

SECTION 084115

SLIDING ALUMINUM AND GLASS DOOR SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sliding aluminum and glass door system, including aluminum frame, threshold, panels, sliding and locking hardware, weather stripping, glass and glazing
   2. Designed to provide an opening glass wall, with sizes and configurations as shown on drawings for NanaWall.

B. Related Requirements: Comply with following:
   1. Glass: Section 088000 - Glazing.

1.2 SYSTEM REQUIREMENTS

A. Design and Performance Requirements: Manufacturer responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   1. Drawings: Diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
   2. Requirements Shown by Details: Establish basic dimension of units, sight lines and profiles of members.
   3. Provide concealed fastening wherever possible.
   4. Provide folding window system, including necessary modifications to meet specified requirements and maintaining visual design concepts.
   5. Attachment Considerations: Take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
   6. Anchors, Fasteners and Braces: Structurally stressed not more than 50 percent of allowable stress when maximum loads are applied.
   7. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
   8. System: Accommodate expansion and contraction within system components due to surface temperature range of 180 degrees F without detrimental effect to system components.
   9. Assemblies: Free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
   10. Glazing Safety Requirements: Comply with CPSC 16 CFR 1201 and ANSI Z97.1.
   11. Anticipated Live Load Interior Beam Deflections: 1/360 of beam length.
   12. Maximum Allowable Deflection: 1/240 of span.

B. Performance Requirement: All outswing system units achieved negative design pressure rating of 55 psf and positive design pressure rating of 55 psf.

C. Interface With Adjacent Systems: Integrate design and connections with adjacent construction.
   1. Accommodate allowable tolerances and deflections for structural members in installation.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for each component.
   2. Include information for factory finish, hardware, glazing accessories and other required components

C. Shop Drawings:
   1. Submit shop drawings indicating design, fabrication and installation of systems.
   2. Include dimensional plans and elevations.
   3. Include large scale details of typical members, glazing components and accessories.

4. Include attachments to adjacent materials.
5. Include hardware details and locations.

D. Samples: Submit samples indicating quality of finish on alloys used for work, 12 inches long for extrusions and 6 inches square for sheet materials.
1. Where normal color and texture variations are expected, include additional samples to show range of such variations.

E. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
2. Test Reports: Submit certified copies of previous tests reports by independent laboratory substantiating performance of system. Include other supportive data as necessary.
3. Qualification Data: Installer's qualification data.
4. Manufacturer's instructions.

F. Closeout Submittals: Submit specified warranty in accordance with Section 017800.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

B. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 PREINSTALLATION CONFERENCE

A. Conference Purpose and Agenda:
1. Arrange with Architect and representatives of folding aluminum window system, and sealant manufacturer to visit Project site before beginning folding window installation operations to analyze site conditions, and inspect surfaces and joints to be sealed in order that recommendations may be made should adverse conditions exist.
2. Discuss following Items:
a. Coordination between each system.
b. Weather conditions under which work will be done.
c. Anticipated frequency and extent of joint movement.
d. Joint design.
e. Glazing procedures.
f. Total weather protection of completed system.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 016000.
1. Protect finish surfaces as necessary to prevent damage.
2. Do not use adhesive papers which become firmly bonded when exposed to sun.
3. Do not leave coating residue on any surface.
4. Replace damaged units.
5. Deliver glass with manufacturer's labels intact. Labels are required to indicate glass thickness, unit location, glass strength and orientation of units in vertical position.
6. Protect glass edges and corners against chipping and cracking.

1.7 WARRANTY

A. Special Warranty: Prepare and submit in accordance with Section 01780.
1. Warranty jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from defective materials and workmanship, and agreeing to replace components which fail within two years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Product: HSW60 - Thermally Broken Aluminum Framed Single Track Sliding System as distributed by NANA WALL SYSTEMS, INC., Mill Valley, CA.

2.2 MATERIALS

A. Extruded Aluminum:
   1. ASTM B221, alloy and temper as recommended by manufacturer for strength, corrosion resistance and application of specified finish.
   2. Frame and Panels: Manufacturer's standard profiles, with head jamb, side jambs, and panels with dimensions shown on drawings.
   3. Provide 11 inch bottom rail width.
   4. Aluminum: Extrusions with nominal thickness of .078". Alloy specified as AlMgSi 0.5 with strength rated as 6063-T5.

B. Fasteners:
   1. Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be non-corrosive and compatible with component being fastened.
   2. Do not use exposed fasteners, except where unavoidable for application of hardware.
   3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
   4. For concealed locations, provide manufacturer's standard fasteners.

C. Protective Coating: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat.

2.3 COMPONENTS

A. Locking Hardware and Handles:
   1. Provide manufacturer's standard flat handle and concealed two point locking hardware operated by 180 degree turn of handle between each pair of sliding panels and on swing panels of configurations with a sliding panel.
   2. Handle finish: As selected by Architect.
   3. Aluminum locking rods capped by Polyamide at top and bottom tracks.
   4. Provide handle height centered at 39 3/8" from bottom of panel.

B. Sliding Hardware:
   1. Provide manufacturer's standard combination sliding hardware with top and bottom tracks.
   2. For each pair of sliding panels, provide 2 two-three wheeled, sintered bronze (oil impregnated) unidirectional sliding panel carriers with a one wheeled, Polymide guide roller that are attached to the panels with stainless steel rods. Maximum carrying capacity of two carriers on a panel to be 330 lbs.
   3. Provide on all four corners of sliding panels and incorporated swing panels, thermally broken, die cast zinc multi- functional corner fittings with carrier connectors, male and female locking receptacles, hinges and hinge pins as required. Finish: Powder coated, closest match to finish of frame and panels.
   4. Provide on the pivot side corner of the upper arm of the top rail of the incorporated swing panel a circular cover in polyamide with a silver gray finish.
   5. Adjustment: Provide system capable of specified amount of adjustments without removing panels from tracks.

C. Other Components:
   1. Threshold: Provide matching aluminum recessed sill.
   2. Weather stripping: Provide manufacturer's standard double layer APTK at both the inner and outer edge of door panels or on frame for vertical sealing between panels and between panels and frame. Provide brush seals with flexible plastic web for all horizontal sealing.
   3. Provide tapered pins or machine screws for connecting frame components.

2.4 GLASS AND GLAZING ACCESSORIES

A. Glass: 1 inch insulating vision glass; Refer to Section 088000.

B. Setting Blocks:
   1. Type: Meet requirements of ASTM C864, preformed EPDM, neoprene, or silicone.
   2. Hardness: 80-90 Shore "A" durometer.
   3. Size: Length equal to 0.1 inch for each square foot of glass, but not less than 4 inch by width 1/16 inch less than channel by sufficient height to provide minimum edge clearance of glass.

C. Glazing Gaskets: Manufacturer's standard tested components.

2.5 FABRICATION

A. General:
1. Fabricate aluminum folding glass window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of units.
2. Provide units that are reglazable without dismantling panel framing.
3. Use extruded aluminum frame and panel profiles, corner connectors and hinges, sliding and folding hardware, locking hardware and handles, glass and glazing and weather stripping as manufactured and tested by manufacturer for sliding glass wall.
4. Factory pre-assemble as is standard for manufacturer and ship with all components and installation instructions.

B. Fabricate assemblies to allow for adequate clearances and shim spacing around perimeter of assemblies to enable proper installation.

C. Accurately and rigidly fit joints and corners.

D. Match components to ensure continuity of line and design.

E. Ensure joints and connections are flush and hairline tight.

F. Apply protective coating on concealed aluminum surfaces in contact with cementitious or dissimilar materials.

G. Size units to allow for tolerances of rough framed openings, clearances, and shim spacing around perimeter of assemblies.

H. Fabricate assemblies to ensure that sliding units can not be removed when in locked position.

I. Assembly:
1. Assemble components into complete weathertight units with flush, rigid, and hairline joints.
2. Mill, cope, butt, and miter joints; secure by mechanical devices or by other means to ensure permanently watertight joints.

2.6 FINISH

A. General:
1. Apply finishes in factory after products are assembled.
2. Protect finishes on exposed surfaces with protective covering, prior to shipment.
3. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process.
4. Trim, flashings, screens, and fasteners finished to match louvers.

B. Fluoropolymer Coating:
1. Comply with AAMA 2605.
2. Resin: 70 percent polyvinylidene fluoride (PVDF).
3. Substrate: Cleaned and pre-treated.
4. Primer:
   a. Coating: Manufacturer's standard resin based compatible coating.
   b. Dry Film Thickness: Minimum 0.20 mil.
5. Topcoat:
   a. Coating: PVDF.
   b. Dry Film Thickness:
      1) Coil: 0.80 mil.
      2) Extrusion: 1.0 mil.
6. Color: Match aluminum framed storefront.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify the structural integrity of header with the deflection limited to less than L/720 of span or 1/4 inch, whichever is less.

C. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.

3.2 INSTALLATION

A. Install assemblies in accordance with Section 017300, manufacturer's instructions, and approved shop drawings. Do not install until finishing of concrete or other operations harmful to glass are completed.

B. Installer to provide anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.

C. If necessary, provide drain connections from lower track.

D. Ensure joints are hairline tight with surfaces of adjacent components flush with each other.

E. Separate aluminum from concrete and dissimilar metals with 30 mil thick protective coating.

F. Set sill members and other frame members in bed of compound or with joint fillers or gaskets, to provide weathertight construction. Coordinate installation with wall flashing and other components.

G. Installation of glass is specified in Section 088000.

3.3 ADJUSTING

A. Test and adjust operating window panel and hardware to provide tight fit at contact points and weatherstripping for smooth operation and weathertight closure.

B. Lubricate hardware and moving parts as necessary.

3.4 CLEANING

A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.

B. Clean metal surfaces exercising care to avoid damage.

END SECTION

SECTION 084127

ALL-GLASS WALL SYSTEMS AND DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. All-glass wall and door systems for:
      a. Lobby and lower portion of windowwall.

B. Related Sections:
   1. Section 057300 – Decorative Railings.
   2. Section 087100 - Door Hardware.

1.2 SYSTEM REQUIREMENTS

A. Design and Performance Requirements:
   1. Manufacturer is responsible for designing systems, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
   3. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of structural glass planar supported glazing system.
   4. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
   5. Provide concealed fastening wherever possible.
   6. Provide all-glass entrances, including necessary modifications to meet specified requirements and maintaining visual design concepts.
   7. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
   8. Anchors, fasteners and braces shall be structurally stressed not more than 50 percent of allowable stress when maximum loads are applied.
   9. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
   10. System shall accommodate expansion and contraction within system components due to surface temperature range of 180 degrees F without detrimental effect to system components.
   11. Assemblies shall be free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
   12. Comply with CPSC 16 CFR 1201 and ANSI Z97.1 for safety requirements of glazing materials.
   13. Maximum allowable deflection: l/360 of span.

B. Interface With Adjacent Systems:
   1. Integrate design and connections with adjacent construction
   2. Accommodate allowable tolerances and deflections for structural members in installation.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for entrance system.
   2. Include information for factory finishes, hardware, glass, sealants, accessories and other required components.

C. Shop Drawings:

1. Submit shop drawings created by storefront manufacturer indicating design, fabrication, and installation of systems.
2. Show anchors, joint system, expansion and contraction provisions and other components not included in manufacturer's standard data.
3. Include wall elevations, typical unit elevations and detail sections.
4. Include glazing, hardware and anchorage details.
5. Clearly indicate locations of exposed fasteners.

D. Samples:
1. Submit samples indicating quality of finish on alloys used for work, 12 inches long for extrusions and 6 inches square for sheet materials.
2. Where normal color and texture variations are expected, include additional samples to show range of such variations.

E. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
2. Qualification Data: Manufacturer's, engineer's, and installer's qualification data.
3. Manufacturer’s installation instructions.

F. Closeout Submittals:
1. Submit under provisions of Section 017800.
2. Warranty: Submit specified warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

B. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Protect finish surfaces as necessary to prevent damage.

C. Do not leave coating residue on any surface.

D. Replace damaged units.

E. Deliver glass with manufacturer's labels intact. Labels are required to indicate glass thickness, unit location, glass strength and orientation of units in vertical position.

F. Protect glass edges and corners against chipping and cracking.

1.6 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Provide written warranty jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from defective materials and workmanship, and agreeing to replace components which fail within 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Stella Glass Hardware, Richmond, BC, Canada or a comparable product of one of the following manufacturers:
1. Oldcastle Glass, Santa Monica, CA.
2. Innovative Structural Glass, Inc.
3. W&W Glass Pilkington, Nanuet, NY.
4. Paragon Architectural Products, LLC., Scottsdale, AZ.

2.2 MATERIALS AND COMPONENTS

A. Clear Tempered Glass:
1. Quality: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q3 glazing select.

2. Type: ASTM C1048, Kind FT fully tempered, with tongless horizontal tempering.
3. Exposed Edges: Beveled, polished smooth.
4. Thickness: 1/2 inch minimum.
5. PPG Industries, Starphire Ultra-Clear.

B. Laminated Glass:
1. Type: Glazing select, float, ASTM C1172, Kind LT.
2. Thickness: 1/2 inch minimum.
   a. Outer Ply: Starphire Ultra-Clear tempered glass.
   b. Innerlayer: 0.030 inch polyvinylbutyral, clear.
   c. Inner Ply: Starphire Ultra-Clear tempered glass.
   d. Basis of Design Product: PPG Industries, Starphire Ultra-Clear or a comparable product of one of the following manufacturers:
   e. Viracon, Owatonna, MN.
   f. McGrory Glass, Aston, PA.
   g. Cardinal Glass, Eden Praire, MN.

C. Framing Systems:
1. Door Fittings: Corner patch plates, top and bottom.
2. Sidelight fittings: Concealed extruded aluminum glazing channels at walls, ceiling and floor.
3. Profile: Square design.
4. Metal for fittings: Extruded aluminum complying with ASTM B221, alloy 6063-T5, 0.125 inch minimum wall thickness.
5. Stainless Steel Cladding: ASTM A240, UNS Number S30200 or S30400, 0.0625 inch minimum thickness.

D. Connection Fittings:
1. Type: Spider.
   a. Non-articulating at straight glazing conditions.
   b. Articulating and curved glass conditions.
2. Material: Stainless steel.
3. Bolts: AB601T stainless steel, button face.
4. Bushings: Nylatron polyamide.
5. Basis-of-Design Product: Stella Glass Hardware, SS20, or a comparable product of one of the following:
   a. Oldcastle Glass, Santa Monica, CA.
   b. Innovative Structural Glass, Inc.
   c. W&W Glass Pilkington, Nanuet, NY.
   d. Paragon Architectural Products, LLC., Scottsdale, AZ.

E. Attachment Devices and Fasteners:
1. Manufacturer’s standard cast or fabricated stainless steel.
2. Two- and Four-arm spider connections of shapes and sizes to suit installation.
3. Provide associated decorative fasteners of non-magnetic stainless steel.

F. Glazing Sealant:
1. Type: Silicone, one-part, conforming to ASTM C920, Type S, Grade NS.
2. Colors: As selected by Architect from full range of manufacturer's standard colors.
3. Primer: When required by sealant manufacturer, type as recommended.
4. Acceptable Products (Glass To Glass):
   a. 999A Silicone Building and Glazing Sealant, Dow Corning Corporation, Midland, MI.
   b. Silglaze II, General Electric Silicones, Waterford, NY.
5. Acceptable Products (Glass To Metal):
   a. 795 Silicone Structural Glazing and Weatherproofing Sealant, Dow Corning Corporation, Midland, MI.
   b. Silpruf, General Electric Silicones, Waterford, NY.

G. Sealant Backer Rod: Type as recommended by sealant manufacturer.

H. Glazing Gaskets, Tapes, Setting Blocks, Edge Blocks and Spacers:
1. Types and sizes recommended by system manufacturer.
2. Compatible with silicone glazing sealant when in contact with each other.

I. Fasteners:
   1. Provide concealed fasteners wherever possible.
   2. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
   3. For concealed locations, provide manufacturer's standard.

2.3 DOOR HARDWARE

A. Pivot and Floor Closer Assemblies:
   1. Acceptable Manufacturers:
      a. Dorma Door Controls, Inc., Reamstown, PA.
      b. Rixson-Firemark, Inc., Franklin Park, IL.
   2. Center pivot - single acting: Rixson PH28 x 554 with 8-1/2 lbs resistance complete with 340 walking beam top pivot assembly and bottom closer arm.
   3. Required Features:
      a. Separate valves for control of closing speed and latching speed.
      b. Adjustable hydraulic or mechanical backcheck.
      c. Positive stop with non-hold open (NHO).
      d. Spindle of length to suit installation conditions.
      e. Cement case of sealed unit design at exterior locations.
      f. Cold weather hydraulic fluid at exterior locations.
      g. Equip with recessed pan where indicated in Hardware Sets.
      h. Equip with stainless steel cover plate, except not required at assemblies with threshold or where recessed pan has been scheduled. Manufacturer's name, logo or other similar identification not permitted on cover plate.

B. Push/Pull Bars: Refer to Section 087100.

2.4 SYSTEM FINISH

A. Stainless Steel:
   1. No. 4 satin finish conforming with NAAMM AMP 503.
   2. Protect finish with factory applied adhesive backed paper covering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 INSTALLATION

A. Install in accordance with Section 017300, details and approved shop drawings.

B. Erect true to line, plumb, level, square and in proper planes with other work, free from twists, sags, waves, buckles or other objectionable defects.

C. Provide anchorage to safely resist stresses to which members will normally be subjected.

D. Anchor securely in place allowing for required movement including expansion and contraction.

E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.

F. Glazing:
   1. Commence glass installation at final stage of construction to avoid damage.
   2. Use setting blocks and spacers of proper size to support and hold glass in position.
   3. Arrange setting blocks and spacers to avoid blocking water transfer inside frames.
   4. Set glass properly centered with uniform bite and edge clearance, free from twist, warp or other distortion likely to develop stress.
   5. Handle and install glass in accordance with manufacturer's directions.
   6. Prevent nicks, abrasion and other damage likely to develop stress on edges.
   7. Install glazing gaskets, tapes, backer rods and related accessories in accordance with manufacturer's written instructions.
   8. Do not apply marking materials to glass surfaces.

G. Glazing Sealant Application:
   1. Follow sealant manufacturer's surface preparation and application instructions without exception.
   2. Ensure sealant bonding surfaces are sound, clean, dry and free of contamination.
   3. Clean glass edges and surfaces in contact with glazing sealant with cleaner recommended by manufacturer.
   4. Mask areas adjacent to joints if necessary to obtain neat sealant line.
   5. Tool sealant concave and remove masking tape immediately.
   6. Clean excess sealant from adjacent surfaces while in uncured stage with recommended solvent.

H. Door Edge Clearances:
   1. Between doors and frame at head and jambs: 1/8 inch.
   2. At sills with thresholds: 1/4 inch.
   3. At sills without thresholds: 1/2 inch.
   4. At meeting edges of pairs of doors: 1/8 inch.

3.3 ADJUSTING

A. Test Door Operating Functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.4 CLEANING

A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.

B. Remove protective paper. Clean surfaces and polish to uniform luster. Exercise care to avoid damage of finishes.

C. Wash glass on interior and exterior to remove paint, soil, prints and foreign matter. Clean glass only with mild detergent and water following glass manufacturer's instructions. Do not use abrasive materials.

END OF SECTION

SECTION 084229

AUTOMATIC ENTRANCES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: All-Glass automatic sliding doors and sidelights.

B. Related Sections:
1. Section 079200 - Joint Sealants.
2. Section 084113 - Aluminum Entrances and Storefronts.
3. Section 088000 - Glazing.
4. Division 26 - Electrical.

1.2 SYSTEM DESCRIPTION

A. Design Requirements:
1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Drawings are diagrammatic and do not purport to identify nor solve problems of operating zones, sight lines, equipment locations, and anchorage.
3. Provide entrances as complete units, including accessory items necessary for proper operation.
4. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
5. Comply with BHMA A156.10.
6. Operate in accordance with manufacturer’s published literature including power operation, emergency breakout for sliding doors, manual use, entrapment protection, and "soft start" features.
7. Size Operator Capacity for:
   a. Door size, weight, and movement.
   b. Condition of exposure.
   c. Long-term, maintenance-free operation under heavy pedestrian traffic load for indicated occupancy.
   d. Opening to back check position in time period no faster than 3 seconds.
   e. Requiring no more than 15 pounds of force to stop door movement.
8. Comply with CPSC 16 CFR 1201 and ANSI Z97.1 for safety requirements of glazing materials.
9. Emergency Exit Doors:
   a. Comply with requirements of applicable code when automatic entrance doors serve as a required means of egress.
   b. Permit automatic release of control to permit manual opening of doors and sidelights on sliding doors.
10. Provide for manual opening and closing operation of door leaves in event of power failure.
11. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish.
12. Coordinate hardware for automatic entrance doors with hardware required for remainder of Project.
13. Products Requiring Electrical Connection: Listed and classified by Edison Testing Laboratories, Factory Mutual, Underwriter’s Laboratories, Warnock Hersey, or other testing agencies acceptable to authorities having jurisdiction as being suitable for specified and indicated purpose.
14. Accommodate building structure deflections in connections to structure.

B. Structural Requirements:
   1. Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units, attachment devices, and building structure.
   2. Wind Load Requirements: Fabricate system to operate doors under design wind loads.

C. Thermal Requirements:
   1. Within surface temperature range variation of 180 degrees F; provide for expansion and contraction of components without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, and other detrimental effects.

D. Air Infiltration Requirements: Provide automatic entrance doors with sweeps that limit air leakage to a rate not to exceed 0.06 cubic feet per minute per square foot of door area when tested in accordance with ASTM E283 at an inward pressure differential of 6.24 pounds per square foot.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for automatic entrances.
   2. Include operating features, operating hardware, accessories, and other components.
   3. Include information for factory finishes, manufacturer’s color charts showing full range of colors available for selection, hardware, glass, sealants, accessories, and other required components.

C. Shop Drawings:
   1. Submit shop drawings for design, fabrication, and installation including relationship to adjoining construction.
   2. Stamp shop drawings with seal and signature of professional engineer responsible for design.
   3. Include layout and dimensions; elevations; head, jamb, and sill conditions; and detail sections.
   4. Clearly indicate locations of exposed fasteners.
   5. Submit detail drawings of special accessory components not included in manufacturer’s product data.

D. Samples:
   1. Submit samples of each specified metal finish, on alloys used for project, 12 inches long for extrusions and 6 inches square for sheets.
   2. Where normal color and texture variations are expected, include minimum of 2 additional samples to show range of such variations.

E. Submit following Informational Submittals:
   1. Support reactions design data.
   2. Certifications specified in Quality Assurance article.
   3. Qualification Data: Manufacturer's, engineer's, and installer's qualification data.
   4. Manufacturer's instructions.

F. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Operation and maintenance data.
   3. Warranty: Submit specified warranty.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Provide automatic entrances from one manufacturer for entire Project.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.

C. Installer Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.

D. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Do not deliver to Project site until system is ready to be installed.

C. Protect electrical components and finished surfaces to prevent damage and exposure to harmful elements.

D. Protect finished surfaces to prevent damage with wrapping or strippable coatings. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sunlight.

E. Do not leave coating residue on surfaces.

F. Replace damaged units.

G. Deliver glass units with manufacturer's labels intact on interior side of glass. Ensure labels indicate glass thickness, unit location, glass strength and orientation of units in vertical position.

H. Protect glass edges and corners against chipping and cracking.

1.6 PROJECT CONDITIONS

A. Environmental Requirements: Comply with requirements of Section 079200 for installation of sealants.

1.7 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Provide written warranty jointly signed by manufacturer, installer, and Contractor agreeing to repair and replace assemblies which fail in material or installation labor during warranty period of 5 years from date of Substantial Completion.

C. Include Coverage for:
   1. Structural failures including excessive deflection, excessive water leakage or air infiltration.
   2. Faulty operation of operators and hardware.
   3. Deterioration of metals and other materials beyond normal weathering.

1.8 MAINTENANCE

A. Materials: Provide wrenches and tools for maintenance of equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. ESA 500 All-Glass Sliding Door, Dorma.
   2. Besam All-Glass Slider by Besam – Assa Abloy.
   3. HD Slide Series 2500 Elegant Door Systems, Horton Automatics.
   4. Dura-Glide All-Glass Series by Stanley Magic Door, Inc., Farmington, CT.

2.2 MATERIALS

A. Aluminum:
   1. Sheets: ASTM B209.
   2. Bars, rod, and wire: ASTM B211 or B221.
   3. Extrusions: ASTM B221.
   4. Structural Shapes: ASTM B308.
   5. Alloy, temper, and thickness, required by manufacturer for strength, corrosion resistance, finish application, and color control.
   6. Minimum Thickness: 0.125 inches for framing members and rails, 0.090 inches for sheets, and 0.0625 inches for glazing stops and similar components.

B. Carbon Steel:
   1. Shapes: ASTM A36.

2. Sheets:
   a. ASTM A446.
   b. Galvanized coating thickness: G60 , complying with ASTM A653.

C. Stainless Steel:
1. Shapes: ASTM A276, UNS Number S30200 or S30400.
2. Sheets:
   a. ASTM A240, UNS Number S30200 or S30400.
   b. Minimum Thickness: 0.0625 inches.

2.3 SLIDING DOORS

A. All-glass door panels and sidelights.

B. Door panels sliding on exterior side of sidelights; door panels capable of swinging breakout.

C. Actuating Mechanism: Sensor.

2.4 COMPONENTS

A. Internal Reinforcing:
1. Use stainless steel or carbon steel where use of structural aluminum is not feasible.
2. Shapes and sizes to suit system description.

B. Anchorage Devices:
1. Manufacturer's standard formed or fabricated aluminum or carbon steel assemblies of shapes, plates, bars, or tubes.
2. Hot-dip galvanize carbon steel assemblies after fabrication; comply with ASTM A123, thickness grade 85, minimum.

C. Fasteners:
1. Aluminum, stainless steel, or other non-corrosive metal fasteners warranted by manufacturer to be compatible with items being fastened.
2. For exposed fasteners, provide Phillips flathead screws with finish matching item fastened.

D. Hardware:
1. Provide manufacturer's hardware for complete installation including, but not limited to following items.
2. Sliding door hardware:
   a. Provide sliding door break-out pivots.
   b. Lock rail: Manufacturer's standard lock rail in finish matching door frame.
   c. Sill configuration:
      1) Provide guide track system at sidelights and no threshold across door opening.
      2) Profile:
         a) Manufacturer's standard top and bottom rail profile.
         b) Maximum rise of 1/2 inch.
         c) Bevel transitions on each side having a rise to run ratio of 1:2.
      3) Material: Extruded aluminum.
      4) Finish: Clear.
      5) Complete with anchors and clips.
3. Deadlocks:
   a. Sliding Door: Deadlock for sliding entrance doors in sill member accepting standard mortise cylinder.
   b. Cylinder Locks: Provided by Section 087100.
   c. Match door finish.

E. Weatherstripping:
1. Pile/brush Type: Manufacturer's standard replaceable weatherstripping of wool, polypropylene or nylon woven pile with nylon fabric and aluminum strip backing complying with AAMA A701.2.
2. Compression Type: Manufacturer's standard replaceable, compressible weatherstripping gaskets of molded neoprene conforming to ASTM C509 or C864.

F. Internal Sealants and Baffles: Types required by manufacturer.

G. Perimeter Sealant and Backing:
   1. Type: Silicone - General Purpose complying with requirements of Section 079200.

H. Glass and Glazing Accessories:
   1. Clear Tempered Glass:
      a. Quality: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q3 glazing select.
      b. Type: ASTM C1048, Kind FT fully tempered without tong marks.
      c. PPG, Starphire Ultra-Clear
      d. Thickness: 1/2 inch.

2.5 EQUIPMENT

A. Electrical Requirements:
   1. Power supply: 120 Volt, 15 ampere, 60 Hz, single phase service per operator.
   2. Provide terminal lugs to match branch circuit conductor quantities, size, and materials indicated.
   3. Factory mount disconnect switch in control panel.
   4. Switch for on-off electric lock operation.

B. Operator:
   1. General:
      a. Comply with BHMA A156.10 and UL 325.
      b. Smooth opening and closing of door and field adjustable opening, closing, and closing check speeds, hold-open time, cancellation on activation of fire alarm system, and time delay (2 to 30 seconds).
      c. Provide for adjustment and access to mechanism without removal of door panels.
      d. Provide fully-adjustable closer for:
         1) Opening, checking, and closing speeds.
         2) Time period door remains open.
      e. Self-contained, concealed, overhead electro-mechanical drive unit with power opening and either power or spring closing.
      f. Provide with checking for opening and closing cycles.
      g. Include connections for power and control wiring.
      h. Equip units with hold-open switch arranged to hold door open without continued use of power.

C. Actuating Controls:
   1. General:
      a. Provide detectors on each side of doors.
      b. Furnish with discriminating signal input circuit, automatic compensation for voltage variations, and automatic rejection of fixed objects within detection zone.
      c. Provide electronic controls to coordinate between actuator controls and operator.
   2. Motion-Detecting Sensors:
      a. Self-contained, motion-detecting control system composed of microwave scanner or infra-red sensing device to activate door operator.
      b. Provide housing for sensing device finished to match finish of doors and frames.
      c. Cause "Door-Open" signal if path of door panels is interrupted.
   3. Electro-Mechanical Operators for Sliding Doors:
      a. Provide safety release clutch for obstructed closing.
      b. Provide emergency breakaway swing feature.
      c. Displacement of sliding doors turns off power to operator.
      d. Provide for easy manual sliding when power is off.

2.6 ACCESSORIES

A. Signage: Comply with BHMA A156.10.

2.7 FABRICATION

A. General:
   1. Fabricate entrances as complete assemblies including frame, doors, sidelights, integral header to house operator, operators, hardware, and accessories.

2. Fabricate frame assemblies in configuration indicated with mechanical joints in accordance with manufacturer's standards using internal reinforcing plates and concealed tie-rods or j-bolts, or fabricate using shear blocks and plates with welded joints.
3. Complete fabrication, assembly, finishing, and hardware preparation before shipment to site.
4. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
5. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
6. Disassemble only to extent necessary for shipment and installation.
7. Accurately fit and secure joints and corners. Make joints weatherproof, flush, and hairline.
8. Maintain continuity of line and accurate relation of planes and angles. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members.
9. Prepare components to receive anchor devices; fabricate anchors.
10. Arrange fasteners and attachments to be concealed from view.
11. Reinforce internally with structural shapes as indicated, or as necessary, to support required loads.
12. Prepare components with internal reinforcement for door hardware and door operator.
13. Reinforce work for performance requirements, and for support to structure.
14. Fabricate units with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
15. Provide for adjusting door height by 1/4 inch minimum.
16. Separate metal surfaces at moving joints with nonmetallic separators to prevent "freeze-up" of joints.
17. Exterior Units:
    a. Fabricate with flashing and weeps to drain penetrating moisture to exterior.
    b. Provide anchorage and alignment brackets for concealed support of assembly from building structure.
    c. Fabricate to allow for thermal expansion and contraction of units.

B. Welding:
1. Comply with American Welding Society requirements.
2. Use electrodes and methods to avoid distortion and discoloration.
3. Perform welding behind finished surfaces to minimize distortion and discoloration on finished surface.
4. Visually Exposed Locations:
    a. Grind exposed welds smooth to remove weld spatter and welding oxides and flush with adjacent surfaces.
    b. Restore mechanical finish at welded locations.

C. Sliding Door:
1. Hang doors from continuous, one-piece trolley with built-in rollers running on track for positive door alignment.
2. Provide anti-riser stops to prevent de-railing.
3. Provide alignment of doors by lateral adjustment provides positive sealing at door edges.

D. Glazing:
1. Provide type and profile of glazing system indicated to receive glazing materials indicated.
2. Fabricate framing to accept glass thicknesses and glazing materials.

E. Hardware:
1. Except for surface-mounted hardware, install at fabrication plant.
2. Remove only as required for final finishing operation, delivery, and site installation.

F. Weatherstripping:
1. Provide adjustable nylon brush sweeps on bottom of doors.
2. Provide pile/brush weatherstripping at jamb rails, head rails, and meeting rails, wherever there is no stop or lap to receive compression weatherstripping.
3. Provide Pile/Brush or Compression Weatherstripping:
    a. Between carrier and head of doors.
    b. On lead stiles of sidelights.

2.8 FINISHES

A. Protective Coatings:
   1. Do not use coatings containing lead.
   2. Separate dissimilar metals and aluminum in contact with concrete utilizing one of following options preventing contact and corrosion:
      a. Apply bituminous paint coating of 30 mil thickness to concealed surface of metals.
      b. Install preformed separators.
      c. Apply non-absorptive plastic or elastomeric tape.
      d. Install gasket between surfaces.
   3. Primed Carbon Steel: Touch-up with primer.
   4. Galvanized Steel: Touch-up with primer.

B. Clear Anodized on Aluminum:
   1. AA M12C22A41.
   2. Architectural Class I, etched, medium matte, clear anodic coating, 0.7 mil minimum thickness complying with AAMA 606.1 or AAMA 608.1.

C. Visually Exposed Stainless Steel: Number 4 satin finish conforming with NAAMM AMP 503.

D. Protect finish with factory applied adhesive backed paper covering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify specified electric power is provided and of correct characteristics.

C. Verify that frame supports and method of attachment to adjoining construction have been installed.

D. Verify Dimensional Tolerances of Rough Openings to be within following limits:
   1. Height: Plus to minus 3/8 inch.
   2. Width: Plus to minus 1/2 inch.
   3. Tolerance diagonally across opening from corner to corner: Plus to minus 1/4 inch.

3.2 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Install units plumb, level, square, true to line, and free from warp, rack, and twist while maintaining dimensional tolerances and alignment with surrounding construction.

C. Provide alignment and shims to permanently fasten systems to building structure.

D. Maintain assembly dimension tolerances and face aligned with adjoining construction.

E. Anchor securely in place, allowing for required movement including expansion and contraction, and live and dead loads that may be transmitted to operating equipment.

F. Separate dissimilar metals and aluminum from concrete at contact points.

G. Set sill members and other members in sealant bed, or with joint fillers or gaskets to provide weather tight construction.

H. Site Tolerances:
   1. Maximum variation from plumb: 1/16 inch in every 10 feet.
   2. Maximum misalignment of two adjoining members abutting in plane: 1/32 inch.
   3. Maximum deviation from established vertical and horizontal 3 mm in 1/8 inch per 12'-0" of length of member, or 1/4 inch maximum in total run in line.
   4. Maximum offset for true alignment between two consecutive members in line, end to end, 1/16 inch.

I. Perimeter Sealant:
   1. Provide perimeter sealant and sealant bond breaker backer materials between assemblies and adjacent construction.
   2. Install in accordance with requirements of Section 079200.

J. Glazing:
   1. Clean rabbets, stops and glass edges of dust, dirt, moisture, oil, and other harmful matter.
   2. Ensure drainage holes are not blocked.
   3. Remove glazing stops and replace in original locations using original fasteners, securely set and accurately aligned.
   4. Use setting blocks, edge blocks, and spacers of proper size, to support and hold glass in position independent of glazing gaskets. Comply with placement requirements of GANA Glazing Manual.
   5. Arrange setting blocks, edge blocks and spacers to avoid blocking water transfer inside frames.
   6. Set glass properly centered with uniform bite and edge clearance, free from twist, warp or other distortion likely to develop stress.
   7. Handle and install glass in accordance with manufacturer's directions.
   8. Prevent nicks, abrasion, and other damage likely to develop stress on edges.
   9. Do not field cut tempered glass.

K. Ensure automatic entrance door components are without damage and deterioration at time of acceptance.

L. Signage: Install in accordance with BHMA A156.10.

3.3 ADJUSTING

A. Adjust parts for smooth, uniform, and optimum operation.

B. Test door operating functions. Adjust opening and closing speeds and breakout forces in accordance with manufacturer's instructions, and code requirements. Adjust motion detector sensors to operate correctly.

C. After repeated operation of completed installation, equivalent to 3 days use by normal traffic (100 to 300 cycles), readjust door operators and controls for optimum operating condition and safety and for weather tight closure.

D. Lubricate hardware, operating equipment, and other moving parts in accordance with manufacturer's requirements.

E. Adjust door operator and actuating controls to comply with BHMA A156.10.

F. Replace cracked, scratched, broken, and otherwise damaged glass.

3.4 CLEANING

A. Clean in accordance with manufacturer requirements. Do not use materials or methods which may damage finish or surrounding construction.

B. Remove protective material from surfaces.

C. Remove excess mastic, mastic smears, harmful materials, and other unsightly marks.

D. Avoid damage to finishes during cleaning.

E. Remove adhered matter and excess sealant materials.

F. Wash glass on interior and exterior to remove paint, soil, prints, and harmful matter. Clean glass only with mild detergent and water following glass manufacturer's requirements. Do not use abrasive materials.

3.5 DEMONSTRATION

A. Demonstrate to Owner's designated personnel operating components, door operation, adjustment features, and lubrication requirements.

3.6 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Institute protective measures required throughout remainder of construction period to ensure that system will be without damage and deterioration, other than normal weathering, at time of acceptance.

C. Provide protective treatment and other precautions required through remainder of construction period.

END OF SECTION

SECTION 085114

OPERABLE ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Operable and fixed aluminum window systems, horizontal sliding type, with factory glazed components, complete with insect screens, reinforcing, shims, anchors, and attachment devices.
   2. Glass and glazing accessories.
   3. Accessories necessary to complete Work.

B. Related Sections:
   1. Section 079200 - Joint Sealants: Perimeter sealants and backup materials.
   2. Section 088000 - Glazing.

1.2 SYSTEM REQUIREMENTS

A. General: In addition to requirements shown or specified:
   1. Comply with design requirements of Section 014450.
   2. Comply with applicable provisions of ANSI/AAMA 101 for design, materials, fabrication and installation of component parts.

B. Design Requirements:
   1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering, to engineer each component of window system.
   3. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage or moisture disposal.
   4. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
   5. Provide assemblies free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
   6. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
   7. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
   8. System shall drain exterior face of wall, water entering joints and condensation occurring within windows by drain holes and gutters of adequate size to evacuate water without infiltration to interior.
   9. Provide concealed fastening wherever possible.

C. Performance Requirements:
   1. Air Infiltration: Air leakage shall not exceed 0.15 CFM per square foot of surface area for fixed units and 0.30 CFM for windows per foot of sash crack when tested in accordance with ASTM E283 at differential static pressure of 1.57 psf.
   2. Water Infiltration: No uncontrolled leakage when tested in accordance with ASTM E331 E547 at test pressure of 6.24 psf, or 15 percent of full positive design wind load, whichever is greater.
   3. U-Value: Provide U-Value of 0.60 or better when tested in accordance with AAMA 1503.1 using glass required for Project.
   4. Condensation Resistance Factor (CRF): Provide CRF of 50 or better when tested in accordance with AAMA 1503.1 procedures.

D. Structural Requirements:
   1. Uniform Load Structural Test: When tested in accordance with ASTM E330 at 150 percent of design pressure, maximum permanent deformation of any component shall not exceed 0.4 percent in accordance with AAMA 101.

E. Thermal Requirements: Framing systems shall accommodate expansion and contraction movement due to surface temperature differential of 180 degrees F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance or other detrimental effects.

F. Glazing Requirements:
   1. Comply with CPSC 16 CFR 1201 and ANSI Z97.1 for safety requirements of glazing materials.
   2. Glass thickness, where indicated, are minimum requirements and are to be confirmed by glass manufacturer.

G. Interface With Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections for structural members in installation.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for windows.
   2. Include information for factory finishes, glass, glazing components, perimeter sealants, accessories, and other required components.
   3. Include information on hardware and operators.
   4. Include color charts for finish indicating manufacturer’s standard colors available for selection.

C. Shop Drawings:
   1. Submit drawings created by window manufacturer indicating elevations, detailed design, dimensions, member profiles, joint locations, arrangement of units, member connections, and thickness of various components.
   2. Stamp shop drawings with seal and signature of professional engineer responsible for design.
   3. Show following Items:
      a. Anchorage system.
      b. Interfacing with building construction.
      c. Provisions for expansion and contraction.
      d. Details of special shapes.
      e. Thermal breaks.
   4. Indicate glazing details and internal sealant requirements.

D. Samples:
   1. Submit samples indicating quality of finish in required colors on alloys used for work, 12 inches long for extrusions and 6 inches square for sheet materials.
   2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
   3. Submit 12 by 12 inch screen mesh.
   4. Submit samples for each type of glass, 12 by 12 inch size.

E. Submit following Informational Submittals:
   1. Support reactions design data.
   2. Test Reports: Submit certified copies of previous tests reports by independent laboratory substantiating performance of system. Include other supportive data as necessary.
   3. Certifications specified in Quality Assurance article.
   4. Qualification Data: Manufacturer's, engineer's, and installer's qualification data.
   5. Manufacturer's Installation Instructions. Include detailed instructions describing each step of reglazing procedures.

F. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Warranty: Submit specified warranty.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Provide window systems that are products of a single manufacturer.
   2. Glass, glazing, and perimeter sealants for window systems are required as Work of this Section for single source responsibility.

B. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering, with minimum of 5 years experience in design of aluminum window systems.

C. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.

D. Installer Qualifications: Certified in writing by manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.

E. Welder Qualifications: AWS certified within past 12 months for each type of weld required.

F. Certifications:
   1. Submit certificates verifying AWS qualifications for each welder employed on Project.
   2. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
   3. Submit coating manufacturer's certification stating fluoropolymer coating formulation is fluorosurfactant free (FSF).
   4. Engineering certifications.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Deliver units preglazed with manufacturer’s labels intact on interior side of glass. Ensure labels indicate glass thickness, unit location, glass strength and orientation of units in vertical position.

C. Store windows in upright position, off ground.

D. Protect finished surfaces to prevent damage.

E. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.

F. Do not leave coating residue on surfaces.

1.6 PROJECT CONDITIONS

A. Ensure ambient and surface temperatures and joint conditions are suitable for installation of materials.

1.7 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Provide written warranty signed by manufacturer stating that work is watertight, free from deflective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 2 years from date of Substantial Completion.

C. RETAIN PARAGRAPH Provide written warranty agreeing to replace defective units and stating insulating glass units will be free from condensation, fogging and obstruction of vision due to film on internal surfaces for 10 years from date of installation. Replacement includes labor and materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Arcadia, Vernon, CA.
2. EFCO Corporation, Monett, MO.
3. Graham Manufacturing Corporation, York, PA.
4. Wausau Window and Wall Systems, Wausau, WI.

2.2 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum:
1. ASTM B221, alloy 6063-T5 for extrusions.
2. ASTM B209 for sheets, alloy and temper recommended by manufacturer appropriate for specified finish.

B. Thermal Break: Manufacturer's standard non-metallic urethane insulating core, isolator spacers, or clip system to provide thermal separation between exterior and interior components.

C. Fasteners:
1. Non-magnetic stainless steel or cadmium plated steel, compatible with materials being fastened.
2. ASTM A167 Series 300 stainless steel for sash and exposed locations; ASTM B633 zinc coated steel for concealed locations.
3. Provide nuts or washers of design having means to prevent disengagement; deforming of fastener threads is not acceptable.
4. Provide concealed fasteners wherever possible.
5. For exposed locations, provide countersunk flathead fasteners with finish matching item fastened.

D. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

E. Shims: Non-staining, non-ferrous, type as recommended by system manufacturer.

F. Protective Coatings: Cold applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

G. Hardware:
1. Manufacturer's standard operating and locking hardware.
2. All hardware edges shall have eased edges. Provide door hardware with smooth edges only.

H. Weatherstripping:
1. Two rows of manufacturer's standard weatherstripping, continuous and replaceable type.
2. Provide woven pile weatherstripping for sliding units with wool, polypropylene, or nylon pile and resin impregnated backing fabric and backing strip complying with AAMA 701.

I. Insect Screen:
1. Frames: Extruded or tubular aluminum, mitered and reinforced corners secured by corner keys, finished to match window frame.
2. Screen Cloth: 18 by 16 woven aluminum mesh complying with FS RR-W-365.
3. Splines: Extruded vinyl.

J. Glazing Gaskets:
1. Provide type of glazing gaskets recommended and tested by window manufacturer for each type window specified.
2. Compression type design preshimmed butyl tapes; or molded or extruded neoprene or ethylene propylene diene monomer (EPDM).
3. Profile and hardness as necessary to maintain uniform pressure for watertight seal.
4. Manufacturer's standard black color.

K. Concealed Sealants: Types recommended by system manufacturer to remain permanently elastic, tacky, non-drying, non-migrating and weathertight.

2.3 GLASS AND GLAZING ACCESSORIES

A. Type Clear Float Glass:
   1. Quality: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q3 glazing select, low iron.
   2. Type: Annealed.
   3. Thickness: 1/4 inch.
   4. Product: PPG Industries, Starphire Ultra-Clear.

B. Type Low E Clear Insulating Glass:
   1. Quality: ASTM E773 and E774, Class CBA, double pane, with manufacturer's standard moisture absorbing desiccant.
   2. Inner Pane:
      a. Type Clear Tempered Glass:
      b. Quality: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q3 glazing select.
      c. Type: ASTM C1048, Kind FT fully tempered, with tongless horizontal tempering.
      d. Thickness: 1/4 inch.
      e. Basis of Design Product: PPG Industries, Starphire Ultra-Clear.
   3. Outer pane:
      a. Type Low E Clear Tempered Glass:
      b. Quality: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q3 glazing select.
      c. Type: ASTM C1048, Kind FT fully tempered, with tongless horizontal tempering.
      d. Low E Coating: Number 2 surface.
      e. Thickness: 1/4 inch.
      f. Basis of Design Product: PPG Industries, Starphire Ultra-Clear.
   4. Air Space: 1/2 inch, dehydrated, hermetically sealed.
   5. Total Thickness: 1 inch.
   6. Edge Seals: Manufacturer's standard sealants, dual seals.
   7. Visible Light Transmission: 80%
   8. U-Value: 0.32
   9. SHGC: 0.68
   10. Shading Coefficient:0.78

C. Setting Blocks:
   1. Type: Meet requirements of ASTM C864, preformed EPDM, neoprene, or silicone, compatible with glazing sealants and seals of insulating glass.
   2. Hardness: 80-90 Shore "A" durometer.
   3. Size: Length equal to 0.1 inch for each square foot of glass, but not less than 4 inch by width 1/16 inch less than channel by sufficient height to provide minimum edge clearance of glass.

2.4 WINDOW TYPES

A. Horizontal Sliding Units:
   1. Provide units complying with AAMA 101 HS-HC40 performance criteria.
   2. Provide units with one fixed and one horizontal sliding sash.
   3. Provide track for nylon rollers with steel ball bearings in sliding sash unit.
   4. Provide combination pull and latch unit that will prevent removal of sash when in latched position.
   5. Provide operating and fixed sash that can be removed from inside without use of tools.
   6. Provide exterior mounted screens.
   7. Restrict sash opening to 9 inches.
   8. Basis-of-Design Product: Arcadia Architectural Products, Inc., ULT-500 Series (thermally broken) Heavy Commercial Sliding Windows, 4" depth.

B. Fixed Windows:
   1. Provide units complying with AAMA 101 F-HC40 performance criteria.
   2. Interior glazed with extruded glazing bead.

2.5 FABRICATION

A. Take accurate field measurements to verify required dimensions prior to fabrication.

B. Fabricate components in accordance with manufacturer's tested assemblies. Remove burrs and ease edges. Shop fabricate and glaze to greatest extent practicable to minimize field assembly. Disassemble only to extent necessary for shipping and handling limitations.

C. Fabricate components true to detail and free from defects impairing appearance, strength or durability.

D. Reinforce components at anchorage and support points, at joints, and at attachment points for interfacing work.

E. Separate dissimilar metals with protective coating or preformed separators to prevent contact and corrosion.

F. Screens:
1. Provide insect screen for each operable unit.
2. Fabricate window unit and operable hardware to accommodate screens in tight fitting removable arrangement.

G. Insulating Glass:
1. Fabricate insulated glass with double edge seals.
2. Provide continuous (including corners) primary seal between glass and desiccant filled spacer fabricated from extruded polyisobutylene.
3. Provide secondary seals completely covering spacer without voids or gaps and continuously bonded to both plates of glass.

H. Glazing:
1. Install glazing gaskets and sealants in accordance with manufacturer's instructions without exception, including surface preparations.
2. Ensure bonding surfaces are sound, clean, dry and free of contamination which would affect bonding strength.
3. Clean glass edges and surfaces in contact with glazing sealant with cleaner recommended by manufacturer.
4. Provide setting blocks and spacers of proper size to support and hold glass in position independent of glazing gaskets. Comply with placement recommendations of GANA Glazing Manual.
5. Set glass properly centered with uniform bite, face clearance and edge clearance, free from twist, warp or other distortion likely to develop stress.
6. Handle and install glass in accordance with manufacturer's directions.
7. Prevent nicks, abrasion and other damage likely to develop stress on edges.
8. Do not field cut tempered or insulating glass.
9. Mask areas adjacent to joints if necessary to obtain neat sealant line.

2.6 FINISH

A. Fluoropolymer Coating:
1. Comply with AAMA 2605.
2. Resin: 70 percent polyvinylidene fluoride (PVDF).
3. Substrate: Cleaned and pre-treated.
4. Primer:
   a. Coating: Manufacturer's standard resin based compatible coating.
   b. Dry Film Thickness: Minimum 0.20 mil.
5. Topcoat:
   a. Coating: PVDF.
   b. Dry Film Thickness:
      1) Coil: 0.80 mil.
      2) Extrusion: 1.0 mil.
6. Color: As selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify dimensions, tolerances, and method of attachment with other Work.

3.2 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Align assemblies plumb and level, free of warp or twist, aligning with adjacent Work.

C. Provide attachments and shims to permanently fasten system to building structure.

D. Anchor securely in place, allowing for required movement, including expansion and contraction.

E. Separate dissimilar materials at contract points, including metal in contact with masonry or concrete surfaces, with protective coating or preformed separators to prevent contact and corrosion.

F. Provide perimeter sealant and backing materials between assemblies and adjacent construction; install in accordance with requirements of Section 079200.

G. Pack fibrous insulation in shim spaces at perimeter to maintain continuity of thermal barrier.

3.3 FIELD QUALITY CONTROL

A. Field Tests: Independent testing laboratory will perform air infiltration tests in accordance with ASTM E783, and water infiltration tests in accordance with AAMA 501.3.

3.4 ADJUSTING

A. Adjust operating sash and hardware to provide tight fit at contact points and weatherstripping for smooth operation and weathertight closure.

B. Lubricate hardware and moving parts as necessary.

3.5 CLEANING

A. Clean surfaces in compliance with manufacturer’s recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.

B. Clean metal surfaces exercising care to avoid damage.

C. Remove adhered matter and excess sealant materials.

D. Replace glass which is broken, cracked, chipped, scratched, abraded or damaged in other ways.

E. Wash glass on interior and exterior to remove paint, soil, prints and foreign matter. Clean glass only with mild detergent and water following glass manufacturer’s instructions. Do not use abrasive materials.

END OF SECTION

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.
3. Division 08 Section “Flush Wood Doors”.
4. Division 08 Section “Access Control Hardware”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.

b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Five years for exit hardware.
3. Twenty five years for manual surface door closer bodies.
4. Ten years for heavy duty floor closers.
5. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

C. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

    a. Two Hinges: For doors with heights up to 60 inches.
    b. Three Hinges: For doors with heights 61 to 90 inches.
    c. Four Hinges: For doors with heights 91 to 120 inches.
    d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Acceptable Manufacturers:

a. McKinney Products (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Acceptable Manufacturers:

a. McKinney Products (MK).
b. Pemko Manufacturing (PE).

C. Continuous Geared Double-acting Hinges. ANSI/BHMA A156.26 Grade 1-600 Certified continuous geared hinges. Hinges are non-handed and allow the door to swing up to 100 degrees in either direction.

1. Acceptable Manufacturers:

a. Pemko Manufacturing (PE) – DHS Series.

D. Floor Closers: ANSI/BHMA A156.4 certified floor closers. Provide independent and adjustable valves for closing speed, latch speed, and backcheck with built-in dead stop and hold open features as specified. Provide finished cover plates or thresholds as indicated in door Hardware Sets.

1. Acceptable Manufacturers:

a. Rixson Door Controls (RF).

E. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.

1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.

2. Bi-folding Door Hardware: Rated for door panels weighing up to 125 lb.

3. Pocket Sliding Door Hardware: Rated for doors weighing up to 200 lb.

4. Acceptable Manufacturers:

    a. Pemko Manufacturing (PE).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Acceptable Manufacturers:

    a. Adams Rite (AD) – 4612 Series.
    b. Securitron (SU) - EL-EPT Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
    a. McKinney Products (MK) - Electrical Connecting Kit: QC-R001.
    b. McKinney Products (MK) - Connector Hand Tool: QC-R003.

2. Acceptable Manufacturers:

    a. McKinney Products (MK) – QC-C Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.

4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Acceptable Manufacturers:

    a. Rockwood Manufacturing (RO).

B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Acceptable Manufacturers:

    a. Rockwood Manufacturing (RO).

C. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

5. Acceptable Manufacturers:

    a. Rockwood Manufacturing (RO).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Manufacturer’s Standard.

D. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

E. Construction Keying: Provide construction master keyed cylinders.

F. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

G. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Acceptable Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

H. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into “Key Wizard” software.

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) – ML2000 Series.
b. Sargent Manufacturing (SA) – 8200 Series.
c. Yale Locks and Hardware (YA) – 8800FL Series.

B. Tubular Locksets:

1. Standard tubular locksets designed to fit ANSI standard 161 door prep without additional through-bolt preps.

2. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - TL3700 Series.

b. Sargent Manufacturing (SA) – DL Series.
c. Yale Locks and Hardware (YA) - RL Series.

2.7 ELECTROMECHANICAL LOCKING DEVICES

A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below.

1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, deadbolt monitoring, and request-to-exit signaling. Support end-of-line resistors contained within the lock case. Unless otherwise indicated, provide electrified locksets standard as fail secure.
2. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - ML20900 Series.
b. Sargent Manufacturing (SA) - 8200 Series.
c. Yale Locks and Hardware (YA) - 8890 Series.

2.8 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.9 ELECTROMAGNETIC LOCKING DEVICES

A. Surface Electromagnetic Locks (Heavy Duty): Electromagnetic locks to be surface mounted type conforming to ANSI A156.23, Grade 1 with minimum holding force strength of 1,200 pounds. Locks to be capable of either 12 or 24 voltage and be UL listed for use on fire rated door assemblies. Electronics are to be fully sealed against tampering and allow exterior

weatherproof applications. As indicated in Hardware Sets, provide specified mounting brackets and housings. Power supply to be by the same manufacturer as the lock with combined products having a lifetime replacement warranty.

1. Acceptable Manufacturers:

    a. Securitron (SU) – M62 Series.
    b. Securitron (SU) – M68 Series.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

4. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

6. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.

7. Rail Sizing: Provide exit device rails factory sized for proper door width application.

8. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.
c. Yale Locks and Hardware (YA) - 7000 Series.

2.11 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt and security type fasteners as required for proper installation.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) – DC6000 Series.
b. Norton Door Controls (NO) - 7500 Series.
c. Yale Locks and Hardware (YA) - 4400 Series.

C. Door Closers, Surface Mounted (Unitrol): Unitrol arms to have door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - Unitrol Series.
b. Norton Door Controls (NO) - Unitrol Series.
c. Yale Locks and Hardware (YA) - Unitrol Series.
d.

D. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - DC6000 Series.
b. Norton Door Controls (NO) - 8500 Series.
c. Sargent Manufacturing (SA) - 1431 Series.
d. Yale Locks and Hardware (YA) - 3500 Series.

2.12 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Acceptable Manufacturers:

a. Rixson (RF) - 980/990 Series.
b. Sargent Manufacturing (SA) - 1560 Series.

2.13 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:

a. Rockwood Manufacturing (RO).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Acceptable Manufacturers:

a. Rixson Door Controls (RF).
b. Rockwood Manufacturing (RO).
c. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:

1. Pemko Manufacturing (PE).

2.15 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.16 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RF - Rixson
4. AD - Adams Rite
5. RO - Rockwood
6. YA - Yale
7. SU - Securitron
8. 00 - Other
9. NO - Norton
10. BM - Besam

Hardware Schedule

Set: 01

Doors: 010B

6	Hinge	TA2314 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Exit Device	7120 EO ECK1	630	YA
1	Exit Device	7120 121NL 1193 x 6-Pin CMK ECK1	630	YA
1	Flush Pull	BF97L	US32D	RO
2	Door Closer	7500	689	NO
2	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE
1	Rain Guard	346C		PE
1	Gasketing	S88BL (Head & Jamb)		PE
2	Sweep	315CN		PE
2	Astragal	18041CNB		PE

Set: 02

Doors: 707A

2	Continuous Hinge	KCFMXX-HD1		PE
1	Threshold Bolt	4015	603	AD
1	Header Bolt	4016		AD
1	Mortise Deadlock	MS1850S	628	AD
1	Cylinder	1194 1160L CMK	626	YA
2	Push Bar & Pull	BF15747	US32D	RO
2	Door Closer	UNIJ7500 7786	689	NO
2	Drop Plate	7786BP	689	NO
1	Threshold	272A Full Notch MSES25		PE
2	Sweep	315CN		PE
1	Status Indicator	4089	RC130	AD

Set: 03

Doors: SG-01

6	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Coordinator	1600	US28	RO
2	Door Closer	7500	689	NO
2	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE

1	Gasketing	S88BL (Head & Jamb)		PE
2	Sweep	315CN		PE
1	Astragal	357SP		PE

Set: 04

Doors: 001A

1	Wall Reader	Salto WRMH001		00
1	Power Supply	BPS-24-3		SU
1	Automatic Bi-Parting Doors	SL500	Clear	BM

Set: 05

Doors: 701A, 706

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Door Closer	7500	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE
1	Gasketing	S88BL (Head & Jamb)		PE
1	Sweep	315CN		PE

Set: 06

Doors: 018B, ST3-1, ST4-1, ST5-1, ST6-1A, ST6-1B, ST7-1

3	Hinge	TA2314 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Exit Device	7150 121NL 1193 x 6-Pin ECK1	630	YA
1	Flush Pull	BF97L	US32D	RO
1	Door Closer	PR7500	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE
1	Rain Guard	346C		PE
1	Gasketing	S88BL (Head & Jamb)		PE
1	Sweep	315CN		PE

Set: 07

Doors: 001B, 001C, 001J, 023, 024, 025, 026, 027A, 027B, 031B, L203

2	Continuous Hinge	KCFMXX-HD1 PT		PE
2	Exit Device	7220MF P EO ECK1	630	YA

1	Cylinder	1194 1160E CMK	626	YA
2	Pull	RM3311-36 Mtg-Type 12XHD	US32D	RO
2	Door Closer	UNIJ7500 7786	689	NO
1	Threshold	272A Full Notch MSES25		PE
2	Sweep	315CN		PE
2	Electric Power Transfer	EL-EPT		SU
2	ElectroLynx Harness	QC-C012P		MK
2	ElectroLynx Harness	QC-C1500P		MK
1	Keyswitch	MKA		SU
1	Controller	782N		YA

Set: 08

Doors: 014

3	Hinge	TA2314 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Entrance Lock	TRR4 8822RL 2196 CMK	626	YA
1	Door Closer	PR7500	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE
1	Rain Guard	346C		PE
1	Gasketing	S88BL (Head & Jamb)		PE
1	Sweep	315CN		PE

Set: 09

Doors: 023A, 032B, 032C, 032D, 701A

1	Continuous Hinge	KCFMXX-HD1		PE
1	Exit Device	8400	628	AD
1	Cylinder	1194 1160L CMK	626	YA
1	Pull	RM3311-36 Mtg-Type 12XHD	US32D	RO
1	Door Closer	UNIJ7500 7786	689	NO
1	Drop Plate	7786BP	689	NO
1	Threshold	272A Full Notch MSES25		PE
1	Sweep	315CN		PE

Set: 10

Doors: 269, 269D

1	Continuous Hinge	KCFMXX-HD1 PT		PE
1	Exit Device	7200 P 121NL 1193 x 6-Pin ECK1	630	YA

1	Pull	RM3311-36 Mtg-Type 12XHD	US32D	RO
1	Door Closer	UNIJ7500 7786	689	NO
1	Threshold	272A Full Notch MSES25		PE
1	Sweep	315CN		PE
1	Electric Power Transfer	EL-EPT		SU
1	ElectroLynx Harness	QC-C012P		MK
1	ElectroLynx Harness	QC-C1500P		MK
1	Wall Reader	Salto WRMH001		00
1	Controller	782N		YA

Set: 11

Doors: ST4-7

1	Continuous Hinge	KCFMXX-HD1		PE
1	Exit Device	8400	628	AD
1	Exit Device Trim	3080 MG 9 3	US32D	AD
1	Door Closer	7500	689	NO
1	Drop Plate	7786BP	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE
1	Sweep	315CN		PE

Set: 12

Doors: 707B

1	Continuous Hinge	KCFMXX-HD1		PE
1	Mortise Deadlock	MS1850S	628	AD
1	Cylinder	1194 1160L CMK	626	YA
1	Push Bar & Pull	BF15747	US32D	RO
1	Door Closer	7500	689	NO
1	Drop Plate	7786BP	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE
1	Sweep	315CN		PE
1	Status Indicator	4089	RC130	AD

Set: 13

Doors: 704

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK

1	Entrance Lock (Lock Body Only)	8822FL LC Less Lever/Escutcheons	626	YA
1	Hotel Lock Trim	Salto AX650-XS4	626	00
1	Door Closer	R 7500	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE
1	Gasketing	S88BL (Head & Jamb)		PE
1	Sweep	315CN		PE

Set: 14

Doors: 001D, 001E, 001F, 001G, 001H, 007A, 007B, 201E, 206C, 208C, 211C, 213C, 217C, 221C, 225C, 231C, 235C, 240C, 242C, 243C, 245C, 247C, 253C, 255C, 256C, 257C, 258C, 259C, 261C, 263C, 265C, 269A, 269C, 271D, 272D, 273D, 274D, 277D, 278D, 279D, 280D, 301C, 302C, 303C, 308C, 313C, 317C, 321C, 325C, 331C, 335C, 338C, 342C, 343C, 345C, 347C, 353C, 355C, 356C, 359C, 365C, 369C, 401C, 402C, 403C, 413C, 421C, 425C, 433C, 435C, 438C, 443C, 445C, 447C, 459C, 466C, 467C, 501C, 502C, 503C, 504C, 506C, 513C, 519C, 527C, 529C, 537C, 540C, 541C, 549C, 551C, 557C, 561C, 563C, 566C, 603C, 608C, 617C, 631C, 637C, 642C, 653C, 655C, 656C, 665C, 669C, 705A, 705B, 708A, 708B, 708C, 708D, OCD-1, OCD-2, OCD-3, OCD-4, P121A, P121B

1	Specialty Doors	All hardware is furnished by the door supplier.

Set: 15

Doors: P1-IS4, P1ST2, P1ST5, P1ST6, P2ST2, P2ST4, P2ST5, P2ST6, P3ST2, P3ST4, P3ST5, P3ST6, P4ST2, P4ST4, P4ST5, P4ST6

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Electrified Mortise Lock	TRR4 8890RL 2196 CMK	626	YA
1	Door Closer	R 7500	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	173A FHSL14		PE
1	Gasketing	S88BL (Head & Jamb)		PE
1	Door Bottom	420APKL		PE
1	Electric Power Transfer	EL-EPT		SU
1	ElectroLynx Harness	QC-C1500P		MK
1	ElectroLynx Harness	QC-C300P		MK
1	Wall Reader	Salto WRMH001		00
1	Power Supply	BPS-24-3		SU

Notes: Connect to fire alarm system.

Set: 16

Doors: P100A, P100B, P200A, P200B, P300A, P300B, P400A, P400B

6	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Passage Latch	TRR4 8801RL	626	YA
1	Coordinator	1600	US28	RO
2	Door Closer	R 7500	689	NO
2	Electromagnetic Holder	980	689	RF
1	Gasketing	S88BL (Head & Jamb)		PE
1	Astragal	357SP		PE

Notes: Install electromagnetic holders to allow for maximum door opening.

Set: 17

Doors: P101A, P101B, P210, P310, P410

6	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Coordinator	1600	US28	RO
2	Mounting Bracket	1601AB/C	US28	RO
2	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer	7500	689	NO
1	Gasketing	S88BL (Head & Jamb)		PE
1	Astragal	357SP		PE

Set: 18

Doors: P115, P120B

6	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Entrance Lock (Lock Body Only)	8822FL LC Less Lever/Escutcheons	626	YA
1	Hotel Lock Trim	Salto AX650-XS4	626	00
1	Coordinator	1600	US28	RO
2	Door Closer	R 7500	689	NO
2	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

1	Astragal	357SP		PE

Set: 19

Doors: P119

6	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Classroom Lock	TRR4 8808RL 2196 CMK	626	YA
1	Coordinator	1600	US28	RO
2	Mounting Bracket	1601AB/C	US28	RO
2	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer	7500	689	NO
1	Gasketing	S88BL (Head & Jamb)		PE
1	Astragal	357SP		PE

Set: 20

Doors: P122, P123, P125

6	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Exit Device	7130F 662F 1193 x 6-Pin CMK	630	YA
1	Coordinator	1600	US28	RO
2	Mounting Bracket	1601AB/C	US28	RO
2	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer	7500	689	NO
1	Gasketing	S88BL (Head & Jamb)		PE
1	Astragal	357SP		PE

Set: 21

Doors: P127A

6	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Classroom Lock	TRR4 8808RL 2196 CMK	626	YA
1	Coordinator	1600	US28	RO
2	Door Closer	R 7500	689	NO
2	Door Stop	406	US32D	RO

1	Gasketing	S88BL (Head & Jamb)		PE
1	Astragal	357SP		PE

Set: 22

Doors: 020

6	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
2	Surface Bolt	580-8	US32D	RO
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
2	Door Stop	406	US32D	RO
1	Astragal	357SP		PE
2	Silencer	608		RO

Set: 23

Doors: 010A

6	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Classroom Lock	TRR4 8808RL 2196 CMK	626	YA
1	Coordinator	1600	US28	RO
2	Door Closer	R 7500	689	NO
2	Door Stop	406	US32D	RO
1	Astragal	357SP		PE
2	Silencer	608		RO

Set: 24

Doors: 006

6	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842	US32D	RO
1	Entrance Lock (Lock Body Only)	8822FL LC Less Lever/Escutcheons	626	YA
1	Hotel Lock Trim	Salto AX650-XS4	626	00
1	Coordinator	1600	US28	RO
1	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer	R 7500	689	NO
1	Door Stop	406	US32D	RO
1	Astragal	357SP		PE
2	Silencer	608		RO

Set: 25

Doors: 013A, 013B, 017

6	Hinge (heavy weight)	T4A3786 5" x 5"	US26D	MK
2	Exit Device	7160 121NL	630	YA
2	Exit Device Trim	Salto AX650XH-XS4		00
2	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer	PR7500	689	NO
1	Astragal	S772BL		PE
2	Silencer	608		RO

Set: 26

Doors: L204A, L204B, L205A, L205B, L304A, L304B, L305A, L305B, L404A, L404B, L405A, L405B, L504A, L504B, L505A, L505B, L604A, L604B, L605A, L605B

6	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Magnetic Lock	M62-SS		SU
2	Pull	853	US26D	RO
2	Surface Overhead Stop	9-X36	630	RF
1	Astragal	355CP		PE
2	Silencer	608		RO
1	Power Supply	BPS-24-3		SU

Notes: The access control system is furnished by the security contractor.

System Operaton:
Ingress: By access credential or when fire alarm is activated.

Set: 27

Doors: HK-24, HK-34, HK-44, HK-54, HK-64, HK66A, HK66B, HK66C

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Entrance Lock (Lock Body Only)	8822FL LC Less Lever/Escutcheons	626	YA
1	Hotel Lock Trim	Salto AX650-XS4	626	00
1	Door Closer	PR7500	689	NO
1	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 28

Doors: P103, P111, P117, P126, P127B

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	TRR4 8808RL 2196 CMK	626	YA
1	Door Closer	R 7500	689	NO
1	Kickplate	K1050 10" 4BE CSK	US32D	RO
1	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 29

Doors: P113, P114

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Passage Latch	TRR4 8801RL	626	YA
1	Door Closer	R 7500	689	NO
1	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 30

Doors: ST2-2, ST2-3, ST2-4, ST2-5, ST2-6, ST2-7, ST3-2, ST3-3, ST3-4, ST3-5, ST3-6, ST3-7A, ST4-2, ST4-3, ST4-4, ST4-5, ST4-6, ST6-2, ST6-3, ST6-4, ST6-5, ST6-6, ST6-7, ST7-2, ST7-3, ST7-4, ST7-5, ST7-6

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Exit Device	7100F TR628F ECK1	630	YA
1	Door Closer	R 7500	689	NO
1	Kickplate	K1050 10" 4BE CSK	US32D	RO
1	Door Stop	406	US32D	RO
1	Threshold	173A FHSL14		PE
1	Gasketing	S88BL (Head & Jamb)		PE
1	Door Bottom	PDB411AE 36"		PE

Set: 31

Doors: P102, P110A

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	TRR4 8808RL 2196 CMK	626	YA
1	Door Closer	PR7500	689	NO
1	Kickplate	K1050 10" 4BE CSK	US32D	RO
1	Door Stop	406	US32D	RO

1	Gasketing	S88BL (Head & Jamb)		PE

Set: 32

Doors: P204, P304, P404

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Door Closer	7500	689	NO
1	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 33

Doors: HK-22, HK-32, HK-42, HK-52, HK-62, HK71

3	Hinge	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Entrance Lock (Lock Body Only)	8822FL LC Less Lever/Escutcheons	626	YA
1	Hotel Lock Trim	Salto AX650-XS4	626	00
1	Door Closer	PR7500	689	NO
1	Kickplate	K1050 10" 4BE CSK	US32D	RO
1	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 34

Doors: P409, P411

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Door Closer	7500	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	173A FHSL14		PE
1	Gasketing	S88BL (Head & Jamb)		PE
1	Door Bottom	420APKL		PE

Set: 35

Doors: P201A, P201B, P301A, P301B, P401A, P401B

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Passage Latch	TRR4 8801RL	626	YA
1	Door Closer	R 7500	689	NO
1	Electromagnetic Holder	980	689	RF

1	Gasketing	S88BL (Head & Jamb)		PE

Notes: Install electromagnetic holders to allow for maximum door opening.

Set: 36

Doors: P122A, P128, P202, P302, P402

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Concealed Overhead Stop	1-X36	630	RF
1	Door Closer	7500	689	NO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 37

Doors: HK-25, HK-35, HK-45, HK-55, HK-65, P112, P120A, P120C, P205, P207, P305, P307, P405, P407

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Door Closer	7500	689	NO
1	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 38

Doors: P121C

3	Hinge	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	TRR4 8808RL 2196 CMK	626	YA
1	Door Closer	PR7500	689	NO
1	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 39

Doors: P1IS4

3	Hinge	TA2314 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Exit Device	7150F P 121NL 1193 x 6-Pin ECK1	630	YA
1	Door Closer	PR7500	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	272A Full Notch MSES25		PE

1	Rain Guard	346C		PE
1	Gasketing	S88BL (Head & Jamb)		PE
1	Sweep	315CN		PE
1	Electric Power Transfer	EL-EPT		SU
1	ElectroLynx Harness	QC-C012P		MK
1	ElectroLynx Harness	QC-C1500P		MK
1	Wall Reader	Salto WRMH001		00
1	Power Supply	BPS-24-3		SU

Set: 40

Doors: 032A

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Exit Device	7150F TR626F 1193 x 6-Pin ECK1	630	YA
1	Door Closer	PR7500	689	NO
1	Door Stop	406	US32D	RO
1	Gasketing	S88BL (Head & Jamb)		PE

Set: 41

Doors: HK-21, HK-23, HK-31, HK-33, HK-41, HK-43, HK-51, HK-53, HK-61, HK-63

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Entrance Lock (Lock Body Only)	8822FL LC Less Lever/Escutcheons	626	YA
1	Hotel Lock Trim	Salto AX650-XS4	626	00
1	Door Closer	R 7500	689	NO
1	Kickplate	K1050 10" 4BE CSK	US32D	RO
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 42

Doors: P110

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Passage Latch	TRR4 8801RL	626	YA
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 43

Doors: P124

3	Hinge	T4A3786 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 44

Doors: 007C, 007D, 015, 016, 030

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	TRR4 8808RL 2196 CMK	626	YA
1	Door Closer	PR7500	689	NO
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 45

Doors: 711A

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Door Closer	7500	689	NO
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 46

Doors: 008A, 009, 021, 711B, 711C, 712A, 712B, 715, 716, 717, P108, P209, P308, P309, P408, ST3-7B

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 47

Doors: 022

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	TRR4 8808RL 2196 CMK	626	YA
1	Door Closer	R 7500	689	NO
1	Kickplate	K1050 10" 4BE CSK	US32D	RO
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 48

Doors: 011, 012, 264, 266, 702, 703

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Push Plate	70C	US32D-MS	RO
1	Pull Plate	106x70C	US32D-MS	RO
1	Door Closer	R 7500	689	NO
1	Kickplate	K1050 10" 4BE CSK	US32D	RO
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 49

Doors: 003A, 003B, P104, P105, P106, P107, P109, P117A, P126A, P127

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Office Lock	TRR4 8807RL 2196 CMK	626	YA
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 50

Doors: P119B

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	TRR4 8805RL 2196 CMK	626	YA
1	Concealed Overhead Stop	1-X36	630	RF
3	Silencer	608		RO

Set: 51

Doors: P130A, P130B

1	Floor Closer	PH SC 28N 90	626	RF
1	Push Bar & Pull	BF15747	US32D	RO

Set: 52

Doors: 014A, 014B, 018A, 029, ST2-1

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK

1	Exit Device (rim, classroom)	7100 TR626F 1193 x 6-Pin CMK ECK1	630	YA
1	Door Closer	R 7500	689	NO
1	Door Stop	406	US32D	RO
3	Silencer	608		RO

Set: 53

Doors: 028, 031A, 711D, 711E

1	Floor Closer	PH SC 28N 90	626	RF
1	Mortise Deadlock	1830	628	AD
1	Cylinder	1194 1160L CMK	626	YA
1	Push Bar & Pull	BF15747	US32D	RO
1	Status Indicator	4089	RC130	AD

Set: 54

Doors: EG709A, EG709B

1	Mortise Deadlock	MS1850S	628	AD
1	Cylinder	1194 1160L CMK	626	YA
1	Status Indicator	4089	RC130	AD

Notes: The balance of the hardware is furnished by the gate supplier.

Set: 55

Doors: L505C, L603, L605C

6	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Flush Bolt	2960	US32D	RO
1	Entrance Lock (Lock Body Only)	8822FL LC Less Lever/Escutcheons	626	YA
1	Hotel Lock Trim	Salto AX650-XS4	626	00
1	Coordinator	1600	US28	RO
2	Mounting Bracket	1601AB/C	US28	RO
2	Surface Closer	PR8501	689	NO
2	Electromagnetic Holder	998	689	RF
1	Threshold	As Detailed		
1	Gasketing	S88BL (Head & Jamb)		PE
2	Door Bottom	PDB411AE 36"		PE
1	Astragal	355CP		PE
1	Privacy Latch	607	DCRM	RO
1	Viewer	622	US26D	RO

Set: 56

Doors: 205, 206, 207, 208, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 238, 240, 241, 242, 243, 245, 247, 249, 251, 253, 255, 256, 257, 258, 259, 261, 263, 265, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 301, 302, 303, 304, 305, 306, 307, 308, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 338, 339, 340, 341, 342, 343, 345, 347, 349, 351, 353, 355, 356, 357, 358, 359, 361, 363, 364, 365, 366, 367, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 413, 415, 417, 419, 421, 423, 425, 427, 429, 431, 433, 435, 437, 438, 439, 440, 441, 442, 443, 445, 447, 449, 451, 453, 455, 456, 457, 458, 459, 461, 463, 464, 465, 466, 467, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 513, 515, 517, 519, 521, 523, 527, 528, 531, 533, 537, 538, 539, 540, 541, 542, 543, 547, 549, 551, 553, 555, 556, 557, 558, 559, 561, 563, 564, 565, 566, 567, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 601, 602, 603, 604, 605, 606, 607, 608, 609, 611, 613, 615, 617, 619, 621, 623, 627, 629, 631, 633, 637, 638, 639, 640, 641, 642, 643, 647, 649, 651, 653, 655, 656, 658, 659, 664, 665, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Entrance Lock (Lock Body Only)	8822FL LC Less Lever/Escutcheons	626	YA
1	Hotel Lock Trim	Salto AX650-XS4	626	00
1	Surface Closer	8501ST	689	NO
1	Door Stop	406	US32D	RO
1	Threshold	As Detailed		
1	Gasketing	S88BL (Head & Jamb)		PE
1	Door Bottom	PDB411AE 36"		PE
1	Privacy Latch	607	DCRM	RO
1	Viewer	622	US26D	RO

Notes: Provide overhead stop (Rixson 10-X36 where wall stop cannot be used.

Set: 57

Doors: 205A, 206A, 207A, 208A, 209A, 211A, 213A, 215A, 217A, 219A, 221A, 223A, 225A, 227A, 229A, 231A, 233A, 235A, 237A, 238A, 239A, 240A, 241A, 242A, 243A, 245A, 247A, 251A, 253A, 255A, 256A, 257A, 258A, 259A, 261A, 263A, 265A, 270A, 271A, 272A, 273A, 274A, 275A, 276A, 277A, 278A, 279A, 280A, 301A, 302A, 303A, 304A, 305A, 306A, 307A, 308A, 309A, 311A, 313A, 315A, 317A, 319A, 321A, 323A, 325A, 327A, 329A, 331A, 333A, 335A, 337A, 338A, 339A, 340A, 341A, 342A, 343A, 345A, 347A, 349A, 351A, 353A, 355A, 356A, 357A, 358A, 359A, 361A, 364A, 365A, 366A, 367A, 369A, 370A, 371A, 372A, 373A, 374A, 375A, 376A, 377A, 378A, 379A, 380A, 401A, 402A, 403A, 404A, 405A, 406A, 407A, 408A, 409A, 411A, 413A, 415A, 417A, 419A, 421A, 423A, 425A, 427A, 429A, 431A, 433A, 435A, 437A, 438A, 439A, 441A, 442A, 443A, 445A, 447A, 449A, 451A, 453A, 455A, 456A, 457A, 458A, 459A, 461A, 464A, 465A, 466A, 469A, 470A, 471A, 472A, 473A, 474A, 475A, 476A, 477A, 478A, 479A, 480A, 501A, 502A, 503A, 504A, 505A, 506A, 507A, 508A, 509A, 511A, 513A, 515A, 517A, 519A, 521A, 523A, 525A, 527A, 529A, 531A, 533A, 537A, 538A, 539A, 540A, 541A, 542A, 543A, 547A, 549A, 551A, 553A, 555A, 556A, 557A, 558A, 559A, 561A, 564A, 565A, 566A, 567A, 569A, 570A, 571A, 572A, 573A, 574A, 575A, 576A, 577A, 578A, 579A, 580A, 601A, 602A, 603A, 604A, 605A, 606A, 607A, 608A, 609A, 611A, 613A, 615A,

617A, 621A, 623A, 625A, 627A, 629A, 631A, 633A, 637A, 638A, 639A, 640A, 641A, 642A, 643A, 647A, 649A, 651A, 653A, 655A, 656A, 658A, 659A, 664A, 665A, 666A, 667A, 669A, 670A, 671A, 672A, 673A, 674A, 675A, 676A, 677A, 678A, 679A, 680A

1	Sliding Door Hdwe	PF28200A7284		PE
2	Pull	RM1240-6 Mtg-Type 5S	US32D	RO

Notes: Install pulls and track hardware to allow door to open to maximum position but still keep pulls accessible without hitting frame.

Set: 61

Doors: 231D, 239D, 251D, 255D, 331D, 339D, 351D, 355D, 431D, 439D, 451D, 455D, 531D, 539D, 551D, 555D, 631D, 639D, 651D

6	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Communicating Door Latch	TRR4 RL228 F	626	YA
1	Deadbolt	D231	626	YA
2	Door Stop	406	US32D	RO
1	Threshold	As Detailed		
1	Gasketing	S88BL (Head & Jamb)		PE
2	Door Bottom	PDB411AE 36"		PE

Set: 62

Doors: 271B, 371B, 471B, 571B, 671B

3	Hinge	T2714 4-1/2" x 4"	US26D	MK
1	Passage Latch	TRR4 RL201	626	YA
1	Surface Overhead Stop	10-X36	652	RF
3	Silencer	608		RO

Set: 63

Doors: 304D, 404D, 504D, 605D

6	Hinge	T2714 4-1/2" x 4"	US26D	MK
1	Flush Bolt	557	US26D	RO
1	Communicating Door Latch	TRR4 RL228 F	626	YA
1	Deadbolt	D231	626	YA
2	Door Stop	406	US32D	RO
1	Threshold	As Detailed		
1	Gasketing	S88BL (Head & Jamb)		PE
2	Door Bottom	PDB411AE 36"		PE

1 Astragal	355CP	PE

END OF SECTION 087100

SECTION 088000

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass for hollow metal and aluminum doors.
   2. Glass for interior borrowed light and sidelight frames.
   3. Glass for aluminum entrances and storefronts.
   4. Glass for aluminum windows.
   5. Glass for all-glass wall systems and doors.
   6. Associated glazing sealants and accessories.

B. Related Sections:
   1. Section 084113 - Aluminum Framed Entrances and Storefronts.
   2. Section 084127 – All-Glass Wall Systems and Doors.
   3. Section 084229 – Automatic Entrances.
   4. Section 085113 - Aluminum Windows.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select adhesives and sealants meeting LEED and Cal-CREEN requirements.

1.2 SYSTEM REQUIREMENTS

A. General: In addition to requirements shown or specified, comply with design requirements of Section 014450.

B. Design Requirements:
   1. Provide continuity of building enclosure to maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of sealant.
   2. Employ registered professional engineer, licensed to practice structural engineering, to engineer each component of glass and glazing system.

C. Performance Requirements: Provide thickness of glass units to withstand specified wind loads.

D. Glazing Requirements:
   1. Comply with CPSC 16 CFR 1201 and ANSI Z97.1 for safety requirements of glazing materials.
   2. Glass thickness, where indicated, are minimum requirements and are to be confirmed by glass manufacturer.
   3. Provide glass of thickness and heat treatment (annealed, heat strengthened or fully tempered) as necessary to prevent temperature stress breakage.
   4. Use 2.5 safety factor of glass to statistical probability of failure (8 lites/1000).
   5. Provide glass complying with ASTM E1300.
   6. Obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Manufacturer's product data for each type of glass and glazing material specified, including glazing accessories and glazing sealants.

C. Shop Drawings:
   1. Sections and details of glass and glazing materials installation at framing members including head, mullions, transoms, jambs and sills.
   2. Stamp shop drawings with seal and signature of professional engineer responsible for design.

D. Samples:
   1. 12 inches by 12 inches in size illustrating color, applied pattern, laminated construction of glass units.
   2. 12 inches long bead of glazing sealant, in color selected.

E. Submit following Informational Submittals:
   1. Test Reports:
      a. Glazing sealant indicating substrate adhesion.
      b. Glazing sealant compatibility.
      c. Glazing sealant manufacturer's recommendations.
   2. Certifications specified in Quality Assurance article.
   3. Qualification Data: Engineer's and installer's qualification data.
   4. Manufacturer's instructions.

F. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Warranty: Submit specified warranty.

G. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Adhesives and sealants.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Glass of each type to be produced by same manufacturer.

B. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering, with minimum of 5 years experience in design of glass and glazing.

C. Installer Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.

D. Regulatory Requirements:
   1. Fabricate glass to comply with ASTM C1036, ASTM C1048, and ANSI Z97.1.
   2. Perform work in accordance with GANA Glazing Manual [and GANA Sealant Manual] for glazing installation methods.
   3. Fire-Resistive Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Certifications:
   1. Manufacturer's letter certifying glass and glazing materials compatibility.
   2. Manufacturer's letter certifying that sealed insulating glass units meet or exceed specification.
   3. Engineering certifications.

1.5 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products in accordance with Section 016000.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Perform glazing when ambient temperature is above [(40 degrees F)].
   2. Perform glazing on dry surfaces only.

1.8 WARRANTY

A. Manufacturer's standard 5 year warranty on hermetically sealed insulating glass units.

PART 2 - PRODUCTS

2.1 GLASS MATERIALS

A. Clear Glass:
1. Quality: Glazing select, float, complying with ASTM C1036, Type I, Class 1, Quality q3.
2. Type: Annealed.
3. Color: Starphire Ultra-Clear.
4. Thickness: 1/4 inch minimum.

B. Clear (Type Glass): Same type as above except tempered, complying with ASTM C1048, Kind FT fully tempered heat-strengthened, complying with ASTM C1048, Kind HS, heat strengthened.

C. Decorative Pattern Type Glass:
1. Quality: Decorative Ceramic Frit, float, complying with ASTM C1036, Type, Class, Form, Quality, and finished required by pattern selected.
2. Thickness: 1/2 inch minimum.
3. Color: Clear.
4. Finish: Decorative frit pattern one side.
5. Pattern: 80% soft white or silver in a uniform manner, as selected by Architect from manufacturer's standard pattern.
6. Acceptable Manufacturers:
   a. AFG Industries, Inc., Kingsport, TN.
   b. Cesar Color, Inc., Burlingame, CA.
   c. Guardian Industries Corporation, Carleton, MI.
   d. Viracon, Owatonna, MN.

D. Insulating Laminated Glass Units:
1. Quality: Double glazed, hermetically sealed around perimeter with continuous metal spacer filled with moisture absorbing desiccant per ASTM E2190, adhered to glass lights with:
   a. Primary Seal: Polyisobutylene.
   b. Secondary Seal: Silicone two-part.
2. Total thickness: 1-1/4 inch.
   a. Laminated Outer Light:
      1) Quality: Glazing select, float, complying with ASTM C1036.
      2) Type: Laminated glazing complying with ASTM C1172, Kind LHS; also meeting code for safety glazing.
      3) Thickness: Nominal 1/2 inch.
         a) Outer Ply: 1/4 inch, Starphire ultra-clear, heat-strengthened.
         b) Plastic Interlayer: 0.035 inch clear, SGP.
         c) Inner Ply: 1/4 inch, Starphire ultra-clear, heat-strengthened.
      4) Basis of Design Glass Product: Starphire Ultra-Clear by PPG.
   b. Inner Lite:
      1) Quality: Glazing select, float.
      2) Type: Annealed; Heat-strengthened, complying with ASTM C1048, Kind HS, heat strengthened where required by heat load; tempered, complying with ASTM C1048, Kind FT fully tempered where required by code for safety glazing.
      3) Inner Lite Thickness: 1/4 inch.
      4) Color: Starphire Ultra-Clear by PPG.
   c. Air Space: 1/2 inch dehydrated air space.
3. Provide glass capable of being in contact with silicone sealants to ensure tenacious glass to silicone to aluminum bond.
4. Furnish insulating glass with edge sealant which is compatible with silicone.
5. Performance Criteria:
   a. Visible Light Transmittance: 76 percent.
   b. Shading Coefficient: 0.69.
   c. U-Value: 0.48.
   d. Solar Heat Gain Coefficient: 0.60.
6. Glass Fabricator Source: GlasPro, Santa Fe Springs, CA

E. Bent Glass:
1. Type: Float Laminated glass, complying with ASTM C1036, Type I, Class 1, Quality q3.
2. Quality: Glazing select, float, complying with ASTM C1172, Kind LHS.
3. Thickness: Nominal 1/2 inch.
   a. Outer Ply: 1/4 inch, Starphire ultra-clear, heat-strengthened by PPG.
   b. Plastic Interlayer: 0.035 inch polyvinylbutyral, clear, Solutia by Eastman.
   c. Inner Ply: 1/4 inch, Starphire ultra-clear, heat-strengthened by PPG.
4. Outside Radius: Varies, field measure to verify.
5. Chord (Point To Point): Varies, field measure to verify.
6. Girth (Length Of Arc): Varies, field measure to verify.
7. Vertical or Horizontal Dimension: Varies, field measure to verify.
8. Performance Criteria:
   a. Visible Light Transmittance: 85 percent.
   b. Shading Coefficient: 0.83.
   c. U-Value: 0.88.
   d. Solar Heat Gain Coefficient: 0.72.
9. Acceptable Fabricators:
   a. Basis of Design: GlasPro, Santa Fe Springs, CA
   b. California Glass Bending Company, Wilmington, CA.
   c. North American Glass, Bensenville, IL.
   d. Standard Bent Glass, Inc., Butler, PA.

F. Fire-Resistive Glazing Glass:
1. Fire-Resistive, Ceramic Glazing Material: Proprietary product of clear flat sheets of fire rated ceramic glazing, permanently labeled by testing and inspecting agency, acceptable to authorities having jurisdiction, showing product complies with fire-resistive installation indicated, and as follows:
   a. Polished on both surfaces, transparent with visible light transmission of 88 percent.
   b. Safety glazing complying with ANSI Z97.1 and CPSC 16 CFR 1201.
   c. Fire-rated glazing material with 3M® Scotchshield® Ultra Film applied to the surface, human impact safety-rated, wireless, fire-rated glass ceramic glazing.
   d. Product: Subject to compliance with requirements, provide the following product manufactured by Nippon Electric Glass Company, Ltd. and distributed by Technical Glass Products, Inc.
      1) FireLite NT Premium safety glazing.
      2) J.R. Four LTD., Fireglass 20
2. Properties:
   a. Thickness: 3/16 inch.
   b. Film: Fire-rated surface film as approved by manufacturer.
   c. Weight: 2.4 lbs./sq. ft.
   d. Approximate Visible Transmission: 88 percent.
   e. Approximate Visible Reflection: 9 percent.
   f. Hardness (Vicker's Scale): 700.
   g. Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications.
   h. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
   i. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.
   j. Surface Finish:
      1) Premium Grade-Ground and polished on both sides.

2.2 GLAZING ACCESSORIES

A. Setting Blocks:
1. Material: Preformed neoprene, compatible with sealant.
2. Hardness: 80-90 Shore A durometer.
3. Size: 0.10 inch for each square foot of glazing, not less than 4 inch length by width of channel minus 1/16 inch by 1/4 inch high sufficient height to provide minimum edge clearance.
4. Location: Sill quarter points, centered minimum 4 inches from each edge.

5. Requirement: Resistant to sunlight, weathering oxidation and permanent deformation under load.

B. Spacer Shims:
1. Material: Preformed neoprene, compatible with sealant.
2. Hardness: 50-60 Shore A durometer.
3. Size: Minimum 3 inch length by 1/2 height of glazing stop by thickness to suit application.
4. Requirement: Self-adhesive one face.

C. Edge Blocks:
1. Material: Preformed neoprene, compatible with sealant.
2. Hardness: 60-70 Shore A durometer.
3. Size: Minimum 4 inch length by width to support thickness of glass, allow nominal 1/8 inch clearance between edge of glass and edge bumper.
4. Location: Place in vertical channel.
5. Requirement: Resistant to sunlight, weathering, oxidation and permanent deformation under load.

D. Glazing Tapes:
1. Material: Preformed butyl or closed cell PVC foam with integral spacing device and containing paper release.
2. Hardness: 10-15 Shore A durometer.
3. Size: Continuous corner to corner.
4. Acceptable Products:
   a. Pre-Shimmed 440 Tape, Tremco, Inc., Beachwood, OH.
   b. Norseal V-980, Saint Gobain Performance Plastics, Granville, NY.

2.3 GLAZING SEALANTS

A. Silicone Sealant:
1. One-part, primerless, complying with FS TT-S-001543A, Class A, FS TT-S-00230C, Class A, and ASTM C920, Type S, Grade NS, Class 25, Use NT, G, A, M, and O.
2. Hardness: 15-25 Shore A durometer.
3. Non-Sagging, Non-Bleeding, Non-Staining. Tested for compatibility.
4. Color: Selected by the Architect.
5. Acceptable Products:
   a. 795, Dow Corning Corporation, Midland, MI.
   b. Silpruf, General Electric Silicones, Waterford, NY.
   c. Rhodorsil 5C, Rhone-Poulenc, Inc., Cranbury, NJ.

B. For primary seal of insulating units: Manufacturer standard sealant.
1. For structural glazing: High modulus (structural) 2-component, non acidic, neutral curing silicone sealant which meets or exceeds Federal Specification TT-S-00227, Type II, Class B and ASTM C920, Type M, NS, Class 12.5.
   a. Color: Black.
   b. Products: The following, or equal,
      1) Dow Corning 983.
      2) General Electric SSG4400.
   c. Painted surfaces in contact with structural silicone must be primed with a primer approved for use by the sealant manufacturer.

C. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
1. Current requirement refers to the date on which the materials are installed in the building.
2. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

D. Adhesives and sealants shall meet or exceed the VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

2.4 GLASS FABRICATION

A. Accurately size glass to fit openings allowing clearances following recommendations of "Glazing Manual" published by Glass Association of North America (GANA).

B. Cut glass clean and carefully. Nicks and damaged edges will not be accepted. Replace glass with damaged edges.

C. Heat Treatment:
   1. Ensure heat-strengthened and tempered glass is examined by glass manufacturer to detect and discard lights which exceed GANA and industry standard tolerances for bow.
   2. Where strengthening process results in essentially parallel ripples or waves, maximum allowable deviation from flatness at any peak-to-valley is 0.003 inch.
   3. Where bow tolerance and wave tolerance differ, stricter requirement governs.
   4. Heat soak test tempered glass with sufficiently high temperature and duration to break glass containing nickel sulfide inclusions.
   5. As an alternative to heat soaking, other quality control measures may be used provided that glass with nickel sulfide inclusions is eliminated.
   6. Upon request by Architect or Owner, submit written quality control records attesting that procedures have been implemented to eliminate nickel sulfide inclusions or that heat soaking requirements have been accomplished.
   7. This Specification defines nickel sulfide inclusions as a glass material defect.

D. Insulating Glass:
   1. Fabricate insulated glass with double edge seals.
   2. Provide continuous (including corners) primary seal between glass and desiccant filled spacer fabricated from extruded polyisobutylene.
   3. Provide secondary seals completely covering spacer without voids or gaps and continuously bonded to both panes of glass.
   4. Provide General Electric IGS 3204 or Dow Corning 982 secondary seals for units which will be attached to frames with silicone sealant.
   5. Verify thickness of secondary seal for silicone supported units for structural adequacy by testing.
   6. Ensure edge seal is capable of transferring at least 3 times force per linear inch produced by design pressure acting on outdoor glass alone or on indoor glass alone.
   7. Ensure secondary seal is capable of withstanding mock-up tests at 1.5 times design pressure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify that openings for glazing are correctly sized and within tolerances.

C. Verify that glazing channel surfaces or recesses are clear, free of burrs, obstructions, irregularities, and glass is free of edge damage or imperfections.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant, if required by sealant manufacturer.

D. Verify that materials used for cleaning edges of sealed insulating units are compatible with sealants and components and will not damage or cause deterioration of the integrity of the sealed insulating unit.

3.3 INSTALLATION

A. Install glass units in accordance with Section 017300. Ensure weep and drainage holes are not blocked by sealants or setting blocks.

B. Preformed Glazing Gaskets (Dry Method):
   1. Cut gasket to proper length.
   2. Weld joints by butting gasket and sealing junctions with sealant.
   3. Place setting blocks at quarter points, with edge blocks no more than 6 inches from corner.
   4. Rest glass on setting blocks and push against stop with sufficient pressure to ensure full contact and adhesion at perimeter.
   5. Install removable stops, avoiding displacement of gasket and exert pressure for full continuous contact.
   6. Install storefront glass in gaskets as specified in Section 084113.
   7. Install fixed aluminum window glass in gaskets as specified in Section 085114.

C. Interior Dry Method (Tape and Tape):
   1. Cut glazing tape to length and install against permanent stop, projecting 1/16 inch above sight line.
   2. Place setting blocks at 1/4 points with edge blocks no more than 6 inches from corners.
   3. Rest glass on setting blocks and push against stop for full contact and adhesion at perimeter.
   4. Place glazing tape on free perimeter of glass in same manner described above.
   5. Install removable stop, avoid displacement of tape, exert pressure on tape for full continuous contact.
   6. Knife trim excess or protruding tape.

D. Interior Wet/Dry Method (Tape and Sealant):
   1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
   2. Place setting blocks at 1/4 points with edge blocks no more than 6 inches from corners.
   3. Rest glass on setting blocks and push against tape with sufficient pressure to ensure full contact and adhesion at perimeter.
   4. Install removable stops, insert spacer strips between glass and removable stops at 2 foot intervals, 1/4 inch below sight line.
   5. Fill gap between glass and removable stop with sealant to depth equal to bite of frame on glass to uniform and level line.
   6. Neatly trim off excess tape to sight line.

E. Tempered Glass:
   1. Do not cut, seam, nip or abrade tempered glass.
   2. Install in windows and sidelights where required by code.

F. Butt Glazing:
   1. Clean areas to receive silicone glazing with products recommended by sealant manufacturer. Use clean white lint-free cloth.
   2. Prime as recommended by sealant manufacturer.
   3. Mask interior face of joint with tape runs of approximately 3 to 6 feet starting at top down overlapping runs.
   4. Apply sealant using cartridge type calk gun or bulk type, hand or air pressure activated, apply as full bead starting from bottom of vertical joint and working up.
   5. Push bead ahead of nozzle to ensure complete filling of joint, do not leave air pockets or voids along edge.
   6. Neatly tool joint immediately, do not use soap or detergent solution.
   7. Remove masking tape immediately following sealant tooling.

G. Fire Rated Glass:
   1. Install in fire-rated doors, fixed metal frames and other locations where indicated.
   2. Embed glass in metal stops with bedding compound complying with NFPA 80.

3.4 PROTECTION

A. Protect finished Work under provisions of Section 017300.

B. After installation, mark glass pane with an "X" by using removable plastic tape or paste.

3.5 CLEANING

A. Clean work under provision of Section 017300.

B. Remove excess glazing materials from finished surfaces.

C. Remove labels after work is completed.

D. Wash and polish both faces not more than 7 days prior to Owner's acceptance of work.

E. Comply with glass manufacturer's recommendations for final cleaning.

END OF SECTION

SECTION 088300

MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Project is a registered US Green Building Council “LEED” project.
   1. Select adhesives and sealants meeting LEED and Cal-GREEN requirements.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for each item.

C. Shop Drawings:
   1. Indicate fabrication and installation details not shown on manufacturer's literature.
   2. Indicate sizes, locations, number of sections, method of mounting, and when applicable, mounting heights.

D. Submit Informational Submittal: Manufacturer's instructions.

E. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Warranty: Submit specified warranty.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Adhesives and sealants.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

1.4 WARRANTY

A. Provide warranty in accordance with Section 017800.

B. Provide written warranty signed by mirror manufacturer agreeing to replace mirrors which develop black edge or silver deterioration within 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Mirror Glass:
   1. Quality: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q2 mirror.
   2. Type: Annealed
   3. Provide mirrors, free from objectionable wave, with safety glass backing complying with CPSC 16 CFR Part 1201, Category II and ANSI Z97.1 glazing standards for mirrors extending to within 18 inches of floor, ceilings, and other similar hazardous locations.
   4. Thickness: 1/4 inch.
   5. Size: One piece units, sizes indicated on Drawings or in sections with sizes indicated on Drawings.
   6. Edges: Square and polished.
   7. Reflective Coating: Manufacturer's standard silver coating followed by electrolytic deposited copper coating and separate coat of protective paint.

B. Mirror Adhesive: Mix of manufacturer’s adhesives and fibers formulated to protect mirror silvering.

C. Primers/Sealers: Types recommended by adhesive manufacturer.
   1. Use primers that comply the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

D. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
   1. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
   2. Sealants shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 PREPARATION

A. Prime or seal back of mirrors and surfaces to receive mirrors as recommended by adhesive manufacturer.

B. Ensure surfaces to receive mirrors mounted with clips are decorated and painted as scheduled prior to installation of mirrors.

3.3 INSTALLATION

A. Adhesive Mounting:
   1. Apply adhesive to back of mirror in accordance with manufacturer's instructions allowing approximately 60 percent coverage when pressed into place.
   2. Press mirror firmly to bond with mounting surface. Allow ventilation space between mirror and substrate; do not seal edges.
   3. Provide temporary support of mirror until adhesive has set.

3.4 CLEANING

A. Remove labels, temporary supports, and protective cover after Work is completed.

B. Clean, wash and polish surfaces following manufacturer's recommendations.

END OF SECTION

SECTION 089100

LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled aluminum.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM DESCRIPTION

A. General: In addition to requirements shown or specified, comply with AMCA Certified Ratings Program for design, materials, fabrication, and installation of component parts.

B. Design Requirements:
   1. Manufacturer is responsible for designing units, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   3. Modify only to meet field conditions and to ensure proper fitting of Work.
   4. Obtain Architect's approval of modifications.
   5. Provide concealed fastening wherever possible.
   6. Free area: Not less than 50 percent.
   7. Wind loading: Designed, engineered and installed to withstand minimum positive and negative wind pressure as indicated in Section 014450.
   8. Attachment considerations shall take into account site peculiarities and expansion and contraction movements to prevent loosening, weakening or fracturing connection between units and substrate.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for metal wall louvers.
   2. Include information for factory finishes, sealants, accessories, and other required components.
   3. Include color charts for finish indicating manufacturer’s standard colors available for selection.

C. Shop Drawings:
   1. Submit shop drawings covering fabrication, installation, and finish of specified systems.
   2. Include following:
      a. Fully dimensioned plans and elevations with detail coordination keys.
      b. Locations of exposed fasteners and joints.

D. Samples:
   1. Submit samples indicating quality of finish in required colors on actual materials used for work, 12 inches long for extrusions and 6 inches square for sheet materials.
   2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
   3. Submit samples for each type of metal wall louver, 12 by 12 inch size.

E. Submit following Informational Submittals:
   1. Test Reports:
      a. Written results of testing specified as part of System Requirements and Source and Field Quality Control articles.
   2. Certifications specified in Quality Assurance article.
   3. Qualification Data:

a. Manufacturer's and installer's qualifications verifying years of experience.
b. Include list of completed projects having similar scope of Work identified by name, location, date, reference names, and phone numbers.

4. Manufacturer's Instructions:
   a. Manufacturer's printed installation instructions.
   b. Indicate by transmittal that copies of instructions and recommendations have been distributed to installer.
5. Manufacturer's Field Reports: Written results and findings of manufacturer's field services specified as part of Field Quality Control.

F. Closeout Submittals
1. Project Record Documents:
   a. Submit under provisions of Section 017800.
   b. Record actual locations of metal wall louvers.
2. Operation and Maintenance Data: Submit manufacturer's printed, recommended operation and maintenance data.
3. Warranty: Submit specified product warranty in accordance with Section 017800.

G. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
   a. Aluminum Louver Materials and Accessories.
2. LEED Credit MRc4.1: Provide documentation certifying the percentage of post-industrial and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
   a. Aluminum Louver Materials and Accessories.
3. LEED Credit MRc5.1: Provide manufacturer name and location data for the following materials:
   a. Aluminum Louver Materials and Accessories.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.

B. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

C. Regulatory Requirements: Ensure metal wall louver components comply with applicable portions of local, state, and federal codes, laws, and ordinances.

D. Certifications:
1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Review requirements of Contract Documents and submittals.

C. Review requirements for inspection and testing, forecasted weather conditions, governing regulations, insurance requirements, and proposed installation procedures and sequencing.

D. Review anchor, tie, and flashing installation requirements.

E. Review requirements of field sample [mock-up] on site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Protect finished surfaces as necessary to prevent damage.

C. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.

D. Do not leave coating residue on any surfaces.

E. Replace damaged units.

1.7 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Provide written warranty jointly signed by manufacturer, installer and Contractor agreeing to repair and/or replace assemblies which fail in material or workmanship during warranty period of 2 years from date of Substantial Completion.

C. Provide written warranty stating organic coating finish will be free from fading more than 10 percent, chalking, yellowing, peeling, cracking, pitting, corroding or non-uniformity of color, or gloss deterioration beyond manufacturer's descriptive standards for 20 years from date of Substantial Completion.

1.8 MAINTENANCE

A. Maintenance Materials:
   1. Furnish under provisions of Section 017800.
   2. Furnish extra metal wall louvers in quantity equal to 2 percent of total material furnished but not less than 2 of each type, color and size.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide aluminum with 20% minimum post-consumer recycled content.

B. Aluminum Sheet: ASTM B209, alloy and temper as recommended by manufacturer.

C. Aluminum Extrusions: ASTM B221, 6063-T5 alloy; temper as recommended by manufacturer.

D. Anchors and Fasteners:
   1. Hot-dip galvanized, stainless steel, aluminum or other non-ferrous metal, compatible with materials to be fastened.
   2. Types, gages, and lengths to suit installation conditions.

E. Bituminous Paint: Manufacturer's standard cold applied asphalt mastic.

F. Blade Braces and Supports: Manufacturer's standard components for louvers of continuous blade design.

2.2 GENERAL FABRICATION REQUIREMENTS

A. Fabricate assemblies of extruded aluminum except where specifically noted otherwise.

B. Field bolt connections between frame members where necessary by louver size. Dress exposed welds smooth and flush with adjacent surfaces.

C. Fabricate frames to suit adjacent construction with tolerances allowing for application of sealants in joints between louvers and adjoining work.

2.3 STATIONARY LOUVERS

A. Continuous Horizontal Blade Assemblies:
   1. Material: Extruded aluminum.
   2. Thickness: Not less than 0.081 inch thickness for extruded aluminum.
   3. Frame Depth: 4 inches.
   4. Blades: 40 degrees, spaced at 5 inch centers.
   5. Provide structural supports, invisible vertical intermediate mullions, and blade braces designed and spaced to withstand wind loading.
   6. Basis-of-Design Product: Industrial Louvers Inc., Delano, MN; Model 450XPI or a comparable product of one of the following:
      a. The Airolite Company, Marietta, OH: Model ENCB 609
      b. Ruskin Manufacturing, Grandview, MO: Model ELF811-55.
   7. Prefabricate corners; shop miter and weld blades, return legs 24 inches minimum.

B. Horizontal Blade Assemblies:
   1. Material: Extruded aluminum.
   2. Thickness: Not less than 0.081 inch thickness for extruded aluminum.
   3. Frame Depth: 4 inches.
   4. Blades: 45 degrees, spaced at 3 inch centers.
   5. Vertical Mullions:3-13/16 inches deep, spaced at 12 inches on center or as indicated.
   6. Basis-of-Design Product: Construction Specialties, Myriad or a comparable product of one of the following:
      a. The Airolite Company, Marietta, Oh.
      b. Ruskin Manufacturing, Grandview, MO.

2.4 LOUVERED PENTHOUSE

A. Drainable Continuous Blade Penthouse Assemblies:
   1. Material: Extruded aluminum.
   2. Roof:
      a. Weatherproof roof, 0.081 inch thick aluminum sheet, reinforced with structural supports.
      b. Heliarc weld corners.
      c. Insulate underside or roof with 1/4 inch thick sound deadening material similar to Scotch-Clad 1000 coating.
      d. Design structure to meet code required loads.
   3. Corners: Mitered.
   4. Thickness: Not less than 0.081 inch for extruded aluminum.
   5. Frame Depth: 6 inches.
   6. Blades: Stormproof.
   7. Provide structural supports, invisible vertical intermediate mullions, and blade braces designed and spaced to withstand wind loading.
   8. Acceptable Products:
      a. Model WRH Relief Gravity Ventilator with ESJ-401 Stationary Louver"; Greenheck Corp.
      b. 6118, Construction Specialties, C/S Group.
      c. MC909, The Airolite Company.

2.5 FINISH

A. General:
   1. Apply finishes in factory after products are assembled.
   2. Protect finishes on exposed surfaces with protective covering, prior to shipment.
   3. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process.
   4. Trim, flashings, screens, and fasteners finished to match louvers.

B. Fluoropolymer Coating:
   1. Comply with AAMA 2605, fluorosurfactant free (FSF) formulation.
   2. Resin: 70 percent polyvinylidene fluoride (PVDF).
   3. Substrate: Cleaned and pre-treated.
   4. Primer:
      a. Coating: Manufacturer’s standard resin based compatible coating.
      b. Dry Film Thickness: Minimum 0.20 mil.
   5. Topcoat:
      a. Coating: PVDF.
      b. Dry Film Thickness:
         1) Coil: 0.80 mil.
         2) Extrusion: 1.0 mil
   6. Color: Manufacturer’s standard colors as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify that prepared openings are ready to receive assemblies and openings are of required dimensions.

3.2 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Align louver assembly to ensure moisture drains from flashings and blades to exterior.

C. Secure with concealed fasteners wherever possible.

D. Apply coat of bituminous paint or zinc chromate primer on concealed aluminum surfaces in contact with cementitious or dissimilar materials.

E. Louvered Penthouse:
   1. Install level, plumb, square and in proper alignment with adjacent surfaces.
   2. Mount penthouse assembly on curbs.
   3. Align louver assembly to ensure moisture drains from flashings and blades to exterior.
   4. Form tight joints with exposed connections accurately fitted together.
   5. Secure with concealed fasteners wherever possible.
   6. Apply coat of bituminous paint or zinc chromate primer on concealed aluminum surfaces in contact with cementitious or dissimilar materials.
   7. Mount screens on inside face of louvers.

3.3 CLEANING

A. Repair exposed to view surfaces which have been damaged to match original condition.

B. Clean surfaces and components to remove foreign substances.

END OF SECTION

DIVISION 09

FINISHES

SECTION 092214

FURRING AND LATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal lath.
   2. Metal trim and accessories.

B. Related Sections:
   1. Section 079200 – Joint Sealants
   2. Section 092400 - Portland Cement Plastering.

1.2 SYSTEM REQUIREMENTS

A. Structural Requirements:
   1. Exterior Soffits: Plaster soffits shall withstand a minimum positive and negative wind pressure of 20 psf and maintain a deflection of not more than L/360 of distance between supports.
   2. Provide suspension system to comply with code requirements for suspended ceilings in seismic zones. Include:
      a. Requirements for California under IBC Seismic Categories D,E,F.
   3. Interior Suspended Ceilings and Soffits: Suspended plaster ceilings and soffits shall maintain a deflection of not more than L/360 of distance between supports.

1.3 SUBMITTALS

A. General: Submit following items in accordance with Section 013300.

B. Product Data: Submit product data for each product.

C. Shop Drawings: Submit detailed shop drawings of unusual conditions in connection with furring and lathing work, including control and expansion joints, reveals, special hangers, special runners, deflection channels and details at light fixtures and other recessed items.
   1. Show sealant application to ensure watertight installation at metal trim joints.
   2. Show framing and supports to resist wind uplift at soffits.

D. Submit following Informational Submittals:
   1. Qualification Data: Installer's qualification data.
   2. Manufacturer's instructions.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in metal furring and lathing work having minimum of 5 years successful documented experience with work comparable to that indicated and specified.

1.5 FIELD SAMPLES

A. General: Comply with provisions of Section 014500.

B. Provide furring and lathing systems in conjunction with field samples specified in following sections:
   1. Section 092400 - Portland Cement Plastering.

1.6 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.
   1. Require attendance of furring and lathing installer and installers of related work, including sealants.
   2. Review installation procedures and coordination required with related work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General: Deliver, store, handle, and protect products in accordance with Section 016000.

B. Deliver to Project Site promptly without undue exposure to weather.

C. Deliver materials in manufacturer's unopened container or bundles, fully identified with name, brand, type and grade.

D. Store in dry ventilated space off the ground.

E. Protect materials from soiling, rusting and damage.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Manufacturers - Metal Trim:
1. Niles Building Products, Niles, OH.
2. Worthington Industries.
3. CEMCO
4. Clark Western
5. Dietrich

2.2 METAL LATH MATERIALS

A. General:
1. Fabricate from cold-rolled steel, complying with ASTM C847.
2. Factory applied galvanized for exterior.
3. Provide lath with “Grade D” asphalt saturated paper firmly attached to back for exterior applications on metal framing systems.

B. Expanded Metal Lath: Flat for soffits; self-furring for walls; diamond mesh, 3.4 pounds per square yard.

C. Cornerite: Diamond mesh expanded metal lath, minimum 2.5 pounds per square yard, 6 inches wide, bent to form 3 inch wings.

D. Strip Mesh: Diamond mesh expanded metal lath, minimum 2.5 pounds per square yard, 4 inches wide.

E. Lath Attachment Devices: Tie wire or other metal supports, of type and size to suit application; to rigidly secure lathing materials in place.

2.3 METAL TRIM MATERIALS

A. General:
1. Materials: Galvanized.
2. Shapes Used as Grounds: Sized and dimensioned to produce required plaster thickness.
3. Flanges: Designed to permit complete embedment of accessory in plaster, alignment, and attachment to underlying surface.

B. Foundation Weep Screed: Fabricated from hot-dip galvanized steel sheet, ASTM A653/A653M, G60zinc coating.

C. Cornerite: Fabricated from metal lath with ASTM A653/A653M, G60, hot-dip galvanized zinc coating.

D. External-Corner Reinforcement: Fabricated from metal lath with ASTM A653/A653M, G60 hot-dip galvanized zinc coating.

E. Cornerbeads: Fabricated from aluminum.
1. Small nose cornerbead with expanded flanges; use unless otherwise indicated.

F. Casing Beads: Fabricated from aluminum; square-edged style; with expanded flanges.

G. Control Joints: Fabricated from zinc; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.

H. Two-Piece Expansion Joints: Fabricated from aluminum; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4-to-5/8-inchwide; with perforated flanges.

I. Reveal Screeds:
1. Material and Finish: Clear anodized aluminum.

2. Provide flanges for embedding into plaster system.
3. Sizes and Shapes:as indicated on Drawings.
4. Manufacturers:
5. Conspec Systems, Inc./Cranford, Cranford, NJ.
   a. Fry Reglet Corporation, Alhambra, CA.
   b. Gordon, Inc., Shreveport, LA.
   c. Pittcon Industries, Riverside, MD.

J. Provide protective coating on concealed surfaces of aluminum to prevent adverse reaction to portland cement plaster.

2.4 ACCESSORIES

A. Flexible Flashing: Refer to Section 072700 for air barrier and for flexible flashing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

3.2 INSTALLATION, GENERAL

A. Install furring and lathing in accordance with applicable requirements of NAAMM Standard EMLA 920-09 and in accordance with ASTM C1063 for exterior work, except for more stringent requirements of manufacturer or these specifications.

B. Install members true to lines and levels and to maintain surface flatness with maximum variation of 1/8 inch in 10'-0" in any direction.

C. Isolate furring and lathing work from structural movement to prevent transfer of loading into work from building structure.

D. Do not allow suspension grille to come in contact with abutting partitions or walls.

E. Control or Expansion Joints:
1. Do not continue lath and furring across control or expansion joints.
2. Provide where indicated and at supporting structure expansion or control joints and where panel sizes or dimensions change.
3. Space control joints for interior work maximum 18'-0" apart in either direction.
4. Control Joints for Exterior Work :
   a. Install at 144 sq. ft. maximum with 18 feet longest length and no greater than 2-1/2 to 1 length to width ratio.
   b. Provide continuous 6 inch wide strip of flexible flashing under each reveal and control joint complying with Technical Services Information Bureau (www.tsib.org) Technical Bulletin No. 220.

3.3 WALL AND FURRED SPACE FRAMING

A. General:
1. Provide metal furring where indicated and specified and as required to provide suitable base for plaster work.
2. Include steel shapes, clips, wire and other attachments necessary to bring plaster to required lines.
3. Secure framing to supporting construction with masonry clips or other approved type anchorage.

B. Coordinate installation of framing with required placement of control and expansion joints. Discontinue framing and provide independent support at joints.

3.4 METAL LATH

A. Apply lath in proper manner to form true surfaces, straight without sags or buckles.

B. Install with long dimension of lath at right angles to direction of supports.

C. Lap at sides not less than 1/2 inch and at ends not less than 1 inch.

D. Stagger end laps at adjoining sheets.

E. Secure to supports by wire ties or approved fasteners at intervals not exceeding 6 inches on centers.

F. Continuously reinforce internal corners with corner mesh, except where metal lath returns 3 inches from corner to form angle reinforcement; fasten at perimeter edges only.

3.5 METAL TRIM

A. Corner Beads:
   1. Provide at external corners and in single lengths where length of corner or jamb does not exceed standard stock lengths.
   2. Miter or cope at corners, and fasten securely with tie wire, hardened galvanized nails, staples or offset head or hooked lath nails.
   3. Space not more than 8 inches on centers staggered at outer edges.

B. Casing Beads:
   1. Provide where indicated and where plastering terminates and is not covered by other finish.
   2. Set beads level, plumb and true to line.
   3. Install in lengths as long as practicable and align joints with concealed splice or tie plates.
   4. Secure trims in such a manner as to hold them in place prior to and during the installation of plaster.

C. Control Joints:
   1. Install vertical joints where double stud backing occurs. Install accessory over substrate then install lath into the trim, securing the ends of the lath through the flanges of the accessory and into the double stud backing. Where no backing occurs, refer to NAAMM Standard EMLA 920-09 Architectural joint page 30.
   2. Space ties not more than 6 inches on centers.
   3. Walls: Apply sealant to each joint at ends and intersections in manner to allow expansion and contraction, but to exclude water infiltration.

END OF SECTION

SECTION 092400

PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Three coat portland cement plaster for application to metal lath.

B. Related Sections:
   1. Section 079200 - Joint Sealants
   2. Section 092214 – Furring and Lathing.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for each product.
   2. Color Charts: Submit for Architect's selection of colors for finish coat having integral color.

C. Sample Panel: Submit sample panels of each finish not less than 2 foot square, on movable frames for preliminary review of color and texture prior to preparation of field samples.

D. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Installer's qualification data.
   3. Manufacturer's instructions. Include applicable temperature ranges.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Except where specified otherwise, obtain plaster materials from a single manufacturer or from manufacturers recommended by prime manufacturer of portland cement plaster.

B. Installer Qualifications: Company specializing in portland cement plaster work having minimum of 5 years successful documented experience with work comparable to that indicated and specified.

1.4 FIELD SAMPLES

A. Comply with provisions of Section 014500.

B. Sample Installation:
   1. For final review of each finish, construct sample panel of approximately 100 square feet as indicated directed.
   2. Install one full size unit in location as directed by Architect.
   3. Show air barrier, flexible flashing, lath, trim, plaster, and construction techniques.

C. Record tools and techniques used in accepted sample for application of final work.

1.5 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Require attendance of plaster installer and installers of related work. Review installation procedures and coordination required with related work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type and grade.

C. Protect plaster materials from contamination and dampness until used. Store in dry, ventilated space, off ground.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after application of plaster.

B. Cold Weather Requirements:
   1. Do not use frozen materials in plaster mixes.
   2. Do not apply plaster to base which is wet, frozen or which contains frost.
   3. When ambient temperature is 40 degrees F and falling, heat materials and furnish heated enclosure for at least 24 hours after plastering in accordance with PCA recommendations.

C. Hot Weather Requirements:
   1. Comply with PCA recommendations.
   2. Protect plaster from uneven and excessive evaporation during hot, dry weather.

1.8 PROJECT CONDITIONS

A. Protect fixtures, frames, inserts and other contiguous work from rusting, soiling or clogging due to plastering.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement:
   1. ASTM C150, Type I, II or III, or air-entrained equivalents as required.
   2. For finish coat, provide white or gray cement, or combination thereof as necessary to achieve selected color.

B. Hydrated Lime: ASTM C206, Type S.

C. Aggregates:
   1. ASTM C897.
   2. Gradation of base coats:

Retained on Standard Sieve	Cumulative Percent Minimum	Weight Retained Maximum
No. 4	-	0
No. 8	0	10
No. 16	10	40
No. 30	30	65
No. 50	70	90
No. 100	95	100
No. 200	97	100

   3. Finish coat: Uniformly graded, passing 30 mesh screen, or other gradation as required to match accepted sample.

D. Bonding Agent: ASTM C932, nonoxidizing, non-crystallizing, non-re-emulsifiable.
   1. Apply to clean, structurally sound CMU surfaces.

E. Fiber Reinforcement: Alkaline-resistant (AR) glass or polypropylene fibers, 1/2 inch long, free of contaminates, manufactured for use in portland cement plaster scratch coat.

F. Base Coat: Polymer modified base coat, applied over brown coat embedded with 4 oz/sq yd mesh to reduce cracking of the finish coat.
   1. Acceptable Product: Basex, Merlex Stucco, Inc.

G. Finish Coat Bonder: Ethylene vinyl acetate emulsion which acts as a liquid bonding agent allowing adhesion of Portland cement materials to base coats or existing surfaces.
   1. Acceptable Product: Superhold, Merlex Stucco, Inc.

H. Factory-Prepared Acrylic Finish Coat:
   1. Premixed 100% Acrylic-based elastomeric product.
   2. Manufacturer:
      a. Senergy

b. Dryvit
c. Stuc-O-Flex
d. Omega
e. Sto

I. Coloring Admixture: Synthetic mineral oxide, harmless to plaster set and strength; stable at high temperature, resistant to ultra-violet light and alkali-resistant; custom color as selected by Architect.

J. Water: Suitable for domestic consumption, free of harmful soluble salts, acids, alkalis and other deleterious matter which would impair the work.

2.2 MIXES

A. General:
1. Mix proportions are by volume, unless otherwise specified. Measurement by shovel method not permitted. Mixes and mix proportions are suggestive only; variations to meet local conditions, manufacturer's requirements, application requirements, or to achieve the desired finish are permitted within limits specified in ASTM C926.
2. Make lime putty from hydrated lime; machine mix with water to putty form; allow to stand at least 15 minutes before using.
3. Provide either neat or ready-mixed materials, at Contractor's option, for finish coat as required to match accepted sample.
4. Fiber Content: Add fiber to following mixes after ingredients have mixed at least 2 minutes. Comply with fiber manufacturer's directions but do not to exceed [(2 pounds per cubic feet)] of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.

B. Scratch Coat Mix:
1. 1 part portland cement
2. 3 to 4 parts aggregate
3. 1/4 part lime
4. Fiber

C. Brown Coat Mix:
1. 1 part portland cement
2. 3 to 5 parts aggregate
3. 1/4 part lime

D. Basecoat: Mix with clean water to consistency of exterior Portland cement brown coat in accordance with manufacturer’s instructions.

E. Integral Color Finish Coat: Factory prepared mix requiring addition of water only in accordance with manufacturer's instructions.

F. Mixing:
1. Use mechanical mixers for mixing plaster, small batches may be hand mixed.
2. Do not use frozen, caked, or lumped material.
3. Clean mechanical mixers, mixing boxes and tools after mixing each batch; keep free of plaster from previous mixes.
4. Thoroughly mix plaster with proper amount of water until uniform in color and consistency.
5. Retempering not permitted; discard plaster which has begun to stiffen.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Carefully examine lathing and accessories which are to receive plaster before plaster is applied. Do not apply plaster until unsatisfactory conditions are rectified and made suitable for application of plaster.

C. Carefully examine metal grounds such as corner beads, screeds and other accessories to see that they are straight, curved, plumb, level, square, or true to required angles before plaster is applied.

3.2 INSTALLATION, GENERAL

A. Install plaster in accordance with ASTM C926 and PCA recommendations, except for more stringent requirements of manufacturer or these specifications.

B. Apply uniform thickness measured in inches from back face of lath as follows:

	SOFFITS	WALLS	COLUMNS	2-Coat on Masonry
First Coat:	3/8	3/8	3/8	3/8
Second Coat:	1/4	3/8	1/4	1/8
Third Coat:	1/8	1/8	1/8	
Fourth Coat:			1/8	

C. Do not exceed more than 1/8 inch in 10'-0" variation from true plumb or level plane in any exposed line of surface, as measured by 10'-0" straightedge placed on any location on surface.

D. Machine Applied Plaster:
1. At Contractor's option, plaster base coats may be machine applied.
2. Comply with PCA recommendations.
3. Apply finish coat in method to achieve specified finish.
4. Determine Proper Consistency by Slump Test as follows:
   a. Take slump test samples from nozzle of plastering machine hose using a 2 by 4 by 6 inch slump cone.
   b. 2-1/2 inches, maximum slump, unless otherwise recommended by plaster manufacturer.

E. Unless otherwise indicated, make interior angles square and external corners square.

F. Where casing beads do not occur at juncture of plaster and hollow metal frames, cut a groove in base coat and later in finish coat to minimize appearance of cracks at these joints.

G. To avoid abrupt changes in uniform appearance of succeeding coat, apply each plaster coat to an entire surface plane without interruption.

H. Joining of wet plaster to set plaster should be made at naturally occurring interruptions in plane of plaster, such as corners or openings in plaster work. Stoppage of plaster within a panel is not permitted.

3.3 PLASTER APPLICATION ON LATH

A. Scratch Coat:
1. Apply first coat with sufficient material and pressure to form full keys through, and to embed into, metal lath.
2. Provide sufficient depth of material over metal lath to allow for scratching of surface.
3. Bring surface to true even plane by rodding; fill surface defects and scratches.
4. As soon as first coat has become firm, scratch entire surface in one direction only to provide mechanical bond with second coat.
5. On vertical surfaces, scratch horizontally.

B. Brown Coat:
1. Begin second coat application after 48 hours moist cure of scratch coat.
2. Apply second coat with sufficient material and pressure to ensure tight contact with scratch coat.
3. Bring surface to true even plane by rodding; fill surface defects and scratches.
4. Pause and allow plaster to achieve proper moisture content so that necessary reconsolidation of plaster can be achieved. Determine correct time for floating by placing a finishing trowel against surface; trowel should not stick to unworked plaster.
5. Float surface and leave uniformly rough to provide bond for finish coat.
6. Moist cure brown coat for 48 hours.
7. Allow scratch and brown coats to set for 7 to 10 days before application of basecoat, mesh, and finish coat.

C. Basecoat and Mesh: Apply 1 coat of basecoat and immediately embed 4-ounce mesh in the second coat of basecoat. Let dry 24 hours. Apply finish coat over base coat, prepared with manufacturer’s recommended liquid bonding agent.

D. Finish Coat:
   1. Provide tools and techniques as required to achieve specified finish.
   2. Apply finish coat with sufficient pressure and material to ensure tight contact with, and complete coverage of, brown coat.
   3. Bring to required plaster thickness; Finish coat not less than 1/16 inch.
   4. Finish surface to uniform trowel finish to match accepted sample.

E. Moist Curing:
   1. Follow procedures for each coat as recommended by ASTM C926 and PCA and as required based on environmental conditions.
   2. Prevent premature dry-out.
   3. Apply fog coat to integrally colored plaster to ensure uniform color.

3.4 PATCHING

A. Work containing cracks, blisters, pits, checks, or discolorations will be rejected. Remove such work, and replace with new. Patching of defective work permitted only with approval of Architect.

B. Neatly perform cutting, patching, repairing and pointing-up operations. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces.

C. Point-up and finish surfaces to match adjacent plaster.

D. Where new plaster adjoins plaster which has been installed more than 48 hours, cut existing plaster at an angle of approximately 45 degrees with surface before installing new plaster.

3.5 CLEANING

A. Remove plaster spillage promptly from adjoining work.

B. Remove protective coverings used to protect other work. Repair or replace surfaces which have been damaged by plastering work.

3.6 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect plaster from weather, freezing, premature drying, marking, dirt, dust, marring or other damage throughout construction period so that it will be without any indication of damage at time of acceptance.

END OF SECTION

SECTION 092528

DIRECT APPLIED EXTERIOR CONCRETE FINISH SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 033000 – Cast–In–Place Concrete

1.2 SYSTEM DESCRIPTION

A. Field applied exterior finish system with integrally colored, textured finish applied to concrete surfaces.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit on system materials.
   1. Include information for accessories and other required components.
   2. Include color charts for finish indicating manufacturer's colors for selection.
   3. Include list of manufacturer approved sealants and sealant manufacturers.
   4. Include sample of warranty.

C. Samples:
   1. Submit four 12 by 12 inches in size for each finish, color, and texture indicated.
   2. Prepare samples using same tools, techniques, and system components intended for actual work.

D. Informational Submittals: Submit following:
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Manufacturer's qualification data.
   3. Qualification Data: Installer's qualification data.
   4. Manufacturer's instructions.

E. Closeout Submittals: Submit following in accordance with Section 017800.
   1. Maintenance data.
   2. Warranty: Specified warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years experience, and member of Exterior Insulation Manufacturers Association.

B. Applicator Qualifications: Certified by manufacturer with experience on at least five projects of similar nature in past five years, and accepted by system manufacturer for this Project.

C. Certifications: Manufacturer's certification that products furnished for Project meet or exceed specified system requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.
   1. Store Materials Under Cover:
      a. Protect from moisture absorption and contamination by harmful materials.
      b. Protect from weather, direct sunlight, and surface contamination.
      c. Maintain within manufacturer's required temperature range.
      d. Protected from damage by construction operations.
      e. Protect from condensation and heat build-up when using temporary covers to prevent damage to system.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Install system when ambient and surface temperatures are within system manufacturer's installation temperature limits, during and 24 hours after installation of wet materials.
   2. Install system within system manufacturer's relative humidity limits.
   3. Comply with Manufacturer's Requirements Regarding:
      a. Coating application in direct sunlight.
      b. Protection of coatings while curing from airborne contamination or adverse weather conditions.

1.7 SEQUENCING

A. Seal Joints: Immediately after base coat has cured and dried as required by manufacturer and before application of finish coat.

1.8 WARRANTY

A. Special Warranty:
   1. Prepare and submit in accordance with Section 017800.
   2. Warrant installed system for five years to be free from defects in material or labor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Vallti, Edinburgh, Eh, Uk.
   1. Omega Products International.
   2. Presto LF Renovation Filler Coating System.

2.2 MATERIALS

A. General:
   1. Coating: M1 classified, water-borne, ready to use renovation filler.
   2. Base Coat Primer: System manufacturer's base coat primer.
      a. Filling ability: 4mm.
      b. Density: 1.2 kg/l, ISO 2811.
      c. Solids Volume: 61 percent.
   3. Water: Clean and potable.

2.3 ACCESSORIES

A. Joint Sealant: Polyurethane - Multi-Component sealant specified in Section 079200.

2.4 MIXES

A. General: Comply with system manufacturer's requirements.
   1. Do not introduce admixtures, water, or other materials, except as approved by system manufacturer.
   2. Use materials within time period requirements of system manufacturer.
   3. Use coating within pot-life time period requirements of system manufacturer.

2.5 FINISHES

A. Finish:
   1. Finish: Hard trowelled.
   2. Color: As selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.
   1. Verify that substrate is within tolerances required by system manufacturer. If manufacturer has no substrate tolerance limit, substrate shall be flat and even within tolerance of 1/8 inch in 48 inches.
   2. Verify that substrate and adjacent materials are dry and frost free.
   3. Verify that substrate's moisture content, cleanliness, and physical condition are within system manufacturer's tolerances and requirements.

3.2 PREPARATION

A. General:
   1. Prepare and clean substrate materials in accordance with system manufacturer's requirements.
   2. Prepare terminations as required by manufacturer.
   3. Place control joints on spacing required by manufacturer.

3.3 INSTALLATION

A. General: Comply with Section 017300.

B. Base and Finish Coating Application:
   1. General:
      a. Do not exceed system manufacturer's maximum coat thickness.
      b. Apply coatings so concrete surface does not telegraph through base and finish coats.
   2. Coat Application:
      a. Apply base coat to concrete with steel trowel in minimum thickness required by system manufacturer.

C. Joint Sealants: Comply with Section 079200.

3.4 PROTECTION

A. Protect finished work in accordance with Section 017300. If protection measures are unsuccessful, restore to condition indistinguishable in appearance from, and equivalent in performance to, undamaged areas by replacing in compliance with system manufacturer's instructions.

END OF SECTION

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 054000 – Non Bearing Metal Studs: Structural steel studs.
   2. Section 078100 – Applied Fireproofing.
   3. Section 078400 – Firestopping.

B. This project is a registered US Green Building Council “LEED” project.
   1. Verify if a local plant (within 500 miles of jobsite) can supply the product.
   2. Verify if any product has any recycled, synthetic, or renewable content.
   3. Provide documentation certifying the percentage of recycled content of metal and gypsum board materials based on material cost per weight.
   4. Adhesives and sealants shall meet or exceed the VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

1.2 DEFINITIONS

A. Wall: A vertical building element used to enclose or separate spaces. Walls include fixed partitions.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: Contractor: Responsible for designing metal framing used to comply with performance requirements, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.

B. Performance Requirements:
   1. Interior Suspended Gypsum Board Ceilings, Soffits, and Bulkheads: Design and install to provide deflection of not more than 1/360 of distance between supports.
   2. Interior Metal Stud/Gypsum Board Assemblies: Design and install to withstand lateral loading (air pressure) of 5 PSF with deflection limit not more than 1/240 of partition height.
   3. Elevator Shaftwall Enclosure: Design and install to withstand lateral loading (air pressure) of 10 PSF with deflection limit not more than 1/240 of partition height.
   4. Interior Metal Stud/Gypsum Board Assemblies at Atriums, Lobbies, Service Corridors, Exits, guest rooms and Elevator Lobbies: Design and install to withstand lateral loading (air pressure) of 10 PSF with deflection limit not more than L/360 of partition height.
   5. Interior Metal Stud/Gypsum Board Assemblies at Locations with Ceramic Tile or Other Hard Surface Finishes: Design and install to withstand lateral loading (air pressure) with deflection limit not more than L/360 of partition height.
   6. Where documents indicate a stud size, size shall be considered minimum. Increase gage to meet minimum performance requirements.
   7. Accommodate building structure deflections in connections to structure.

C. Fire Resistance Ratings:
   1. Where assemblies with fire ratings are indicated, provide materials and installations which are identical to assemblies tested in accordance with ASTM E119 by testing laboratories acceptable to authorities having jurisdiction.
   2. Construct assemblies identical to those indicated by reference to GA 600 or to design designations listed by Factory Mutual, Underwriters Laboratories, Warnock Hersey, or listing of other agencies acceptable to authorities having jurisdiction.
   3. Provide partition head assemblies for fire-rated full height partitions that have been successfully tested to accommodate deck deflection.

D. Acoustical Requirements: Where sound-rated assemblies are indicated, provide materials and installation for sound-rated assembly tested and classified by manufacturer to achieve Sound Transmission Class (STC) rating scheduled or indicated. Provide acoustical outlet box pads at outlet boxes.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for:
      a. Framing members selected based on span and performance loading for this Project.
      b. Control joints and locations.
      c. Acoustical sealants.
      d. Acoustical Outlet box pads.
      e. Architectural metal trim.
   2. Include data to indicate framing member materials, product criteria, section properties, load charts, and limitations.
   3. Include information for factory finishes, acoustical ratings, and fire resistance ratings.
   4. Include color charts for finish indicating architectural metal trim manufacturer's standard colors available for selection.
   5. Include acoustical performance information for resilient furring.

C. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Manufacturer's instructions. Include applicable temperature and humidity ranges, special procedures, and perimeter conditions requiring special attention.

D. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Framing Materials (steel)
      b. Gypsum Board
      c. Moisture Resistant Gypsum Board
      d. Glass-Fiber Faced Tile Backing Gypsum Board
      e. Gypsum Liner Panels
      f. Cementitious Tile Backing Board
      g. Metal Trim (steel)
      h. Acoustical Insulation
   2. LEED Credit MRc4: Provide Recycled content data for each different product type, size and manufacturer used for the following materials:
      a. Gypsum Board
      b. Moisture Resistant Gypsum Board
      c. Glass-Fiber Faced Tile Backing Gypsum Board
      d. Gypsum Liner Panels
      e. Cementitious Tile Backing Board
      f. Acoustical Insulation
      g. Recycled content materials claims shall meet the following requirements:
         1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e).
         2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and post-industrial content, as defined in the document referenced above, used in each product type used.
   3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Framing Materials (steel)
      b. Gypsum Board
      c. Moisture Resistant Gypsum Board
      d. Glass-Fiber Faced Tile Backing Gypsum Board

e. Gypsum Liner Panels
f. Cementitious Tile Backing Board
g. Metal Trim (steel)
h. Acoustical Insulation

4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
   a. Laminating Adhesive
   b. Sealant and Sealant Primers

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Except where specified otherwise, obtain gypsum board products, trim, joint treatment, and accessories from single manufacturer or from manufacturers recommended by prime manufacturer of gypsum board products.

B. Certifications:
   1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
   2. Submit certification for each proposed fire rated and sound rated assembly attesting compliance with indicated requirements.

1.6 FIELD SAMPLES

A. General: Comply with provisions of Section 014500.

B. Sample Installation:
   1. Levels of Finish:
      a. Provide for Level of Finish 4.
      b. Provide sample of approximately 100 square feet for each Level of Finish representing completed work.
   2. Install as directed by Architect.
   3. Show finishing of joints between units, trim edge finishing, and construction techniques.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Storage and Protection:
   1. Store in dry ventilated space off ground.
   2. Protect materials from surface contamination, soiling, corrosion, construction traffic, and damage.
   3. Support on level platform and fully protect from weather and direct sunlight exposure.
   4. Store and support gypsum board in flat stacks to prevent sagging.
   5. Protect materials to keep them dry. Remove wet gypsum board from Project site except for gypsum board wetted for application to curved surfaces.
   6. Protect gypsum board panels to prevent damage to edges, ends, and surfaces.
   7. Do not bend or damage metal trim.

1.8 PROJECT CONDITIONS

A. Environmental Requirements: Comply with more restrictive of ASTM C840, or manufacturer's written requirements under which products can be installed.
   1. Maintain minimum uniform 50 degrees F temperature in building for 48 hours before and continuously until applied joint treatment and bonding adhesives are thoroughly dry.
   2. Do not allow ambient temperature to exceed 95 degrees F.
   3. Provide ventilation to remove moisture in excess of that required for drying of joint treatment materials after its application. Avoid drafts during dry, hot weather to prevent too rapid drying.

PART 2 - PRODUCTS

2.1 FRAMING MATERIALS

A. General:
1. Maximize use of recycled steel content with minimum of 60 percent.
2. Studs, runners, and furring channels complying with ASTM C645.
3. Provide with galvanized coating complying with ASTM A653, G40 thickness; rolled channels used in ceilings may be finished with manufacturer's standard rust inhibitive paint. [At following locations provide following coating thicknesses:
   a. Showers and exterior soffits: G60.
4. Fire Rated Partition Head Construction Joint Assembly:
   a. "Fire Trak" by Fire Trak Corporation, Kimball MN.
   b. "SLP-TRK" by Slip Track Systems and Marketed by The Donovan Company, Inc.
   c. VertiTrack Series, The Steel Network, Inc. Raleigh, NC.

B. Steel Stud and Shaftwall Framing Systems:
1. Non-load-bearing roll formed galvanized steel.
2. Wall studs: Channel-shaped design with punched web, manufacturer's standard return flange lip.
3. Wall Stud Runners: Channel type members, with 1-1/4 inch flanges, and same sheet metal thickness as wall studs.
4. Extended Leg Ceiling Runners: Channel type members, with 2 inch flanges, and same sheet metal thickness as wall studs.
5. Bracing Members: Same size as studs.
6. Shaftwall Studs: "CH", "CT", "E", and "I" shaped studs.
7. Shaftwall Runners: "J" shaped runner track, same sheet metal thickness as shaftwall studs.
8. Wall Studs:
   a. Type 25:
      1) Return flange lip minimum dimension: 3/16 inches.
      2) Flange width minimum dimension: 1-1/4 inches.
      3) Uncoated sheet steel thickness: 0.0179 inches.
   b. Type 22:
      1) Return flange lip minimum dimension: 3/16 inches.
      2) Flange width minimum dimension: 1-1/4 inches.
      3) Uncoated sheet steel thickness: 0.0270 inches.
   c. Type 20:
      1) Return flange lip minimum dimension: 3/16 inches.
      2) Flange width minimum dimension: 1-1/4 inches.
      3) Uncoated sheet steel thickness: 0.0329 inches.
   d. Type 18:
      1) Return flange lip minimum dimension: 1/2 inches.
      2) Flange width minimum dimension: 1-5/8 inches.
      3) Uncoated sheet steel thickness: 0.0478 inches.
   e. Type 16:
      1) Return flange lip minimum dimension: 1/2 inches.
      2) Flange width minimum dimension: 1-5/8 inches.
      3) Uncoated sheet steel thickness: 0.0598 inches.
9. Shaftwall Stud Uncoated Sheet Steel Thicknesses:
   a. Type 25: 0.0179 inches.
   b. Type 22: 0.0270 inches.
   c. Type 20: 0.0329 inches.

C. Furring Channels: Hat-shape, 7/8 inch high, 26 gage uncoated metal thickness.

D. Resilient Furring Channels: 1/2 inch high, 26 gage uncoated metal thickness single perforated metal leg design or expanded metal double leg design furring, capable of reducing sound vibration transmission.

E. Ceiling and Soffit Framing - Channel and Cross Furring System:
1. Comply with ASTM C754.

2. Main Runner Channels:
   a. Cold-rolled or hot-rolled steel.
   b. Size: 1-1/2 inch minimum.
   c. Weight: 0.45 pounds per foot, minimum.
3. Furring Anchorages: 16 gage thick galvanized wire ties, or wire-type clips.

F. Ceiling and Soffit Framing - Proprietary Direct Hung Suspension System:
1. At Contractor's option, provide factory fabricated, proprietary system in lieu of channel and cross furring framing system at non-fire rated conditions.
2. Provide interlocking cold-rolled sheet steel grid complying with ASTM C635, "Heavy Duty" structural classification.
3. Acceptable Products and Manufacturers:
   a. 640 Drywall Furring System, Chicago Metallic, Chicago, IL.
   b. DFR-Series, Worthington Steel, Malvern, PA.
   c. Rigid X, USG Interiors, Inc., Chicago, IL.

G. Ceiling and Soffit Framing - Fire Rated Proprietary Direct Hung Suspension System:
1. Interlocking cold-rolled sheet steel grid complying with ASTM C635, "Heavy Duty" structural classification.
2. Acceptable Products And Manufacturers:
3. 650 Fire Front Drywall Furring System, Chicago Metallic, Chicago, IL.
   a. DFR-Series Fire-Rated Drywall Furring System, Worthington Steel, Malvern, PA.
   b. Rigid X fire-rated, USG Interiors, Inc., Chicago, IL.

H. Ceiling and Soffit Attachment Devices:
1. General:
   a. Size devices for 5 times load imposed by completed system as determined in accordance with ASTM E488.
   b. Powder-actuated fasteners in concrete: Size devices for 10 times load imposed by completed system as determined in accordance with ASTM E1190.
2. Hanger Anchorage Devices: Screws, clips, bolts, inserts or other devices applicable to indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven by certified test data.
3. Hanger Wire Concrete Inserts: No. 6 galvanized wire loop and 26 gage thick galvanized shell 14 gage thick galvanized steel strap with 5/16 inch hole.
4. Hangers: Comply with requirements of ASTM C754 for maximum ceiling area and loads to be supported.

2.2 GYPSUM BOARD PRODUCTS

A. Acceptable Manufacturers:
1. Certainteed
2. G-P Gypsum Corporation
3. National Gypsum Company.
4. United States Gypsum Company.

B. Gypsum Board:
1. Maximize use of recycled or synthetic gypsum with minimum of 5 percent.
2. Use recycled newsprint including post-consumer waste for facing paper.
3. Comply with ASTM C1396.
4. Type X or manufacturer's proprietary fire rated core for fire rated and shaftwall assemblies and locations where indicated; regular type at other assemblies.
5. Maximum available lengths to minimize end-to-end butt joints, square cut ends, tapered edge.

C. Moisture-Resistant Gypsum Board:
1. Comply with ASTM C1396.
2. Type X or manufacturer's proprietary fire rated core for fire rated and shaftwall assemblies and locations where indicated; regular type at other assemblies.
3. Maximum available lengths to minimize end-to-end butt joints, square cut ends, tapered edge.
4. 5/8 inch thickness, except where indicated otherwise.

5. Do not use in shower or other wet areas.

D. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
1. Comply with ASTM C1396.
2. Core: Mold and moisture resistant gypsum core, 5/8 inch, Type X.
3. Surface paper: 100% recycled content moisture/mold/mildew resistant paper on front, back, and long edges.
4. Maximum available lengths to minimize end-to-end butt joints, square cut ends, tapered edge.
5. Locations: Toilet Rooms.
6. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
7. Product and Manufacturer:
a. XP Wallboard, National Gypsum Company.
b. Proroc® Moisture And Mold Resistant With M2tech, Certainteed
c. Sheetrock Brand Mold Tough, USG.

E. Glass Fiber Faced Gypsum Sheathing: Refer to Section 061643.

F. Gypsum Shaftwall Liner Panels:
1. Comply with ASTM C1396.
2. Type X or manufacturer's proprietary fire rated core.
3. Maximum available lengths to minimize end joints; beveled edge.
4. 1 inch thickness.

2.3 CEMENTITIOUS TILE BACKING BOARD

A. Description:
1. Cementitious composition with glass fiber reinforcement.
2. Product specifically manufactured as substrate material for application of ceramic tile in wet areas.
3. Comply with ASTM C1325.
4. 5/8 inch thickness, except where indicated otherwise.
5. Use as option to glass-fiber faced tile backing gypsum board
6. Acceptable Products and Manufacturers:
a. Durock Cement Board, United States Gypsum Company, Chicago, IL.
b. PermaBase Cement Board, National Gypsum Company, Charlotte, NC.
c. DomCrete Cementitious Tile Backer Board, Domtar Gypsum, Ann Arbor, MI.
d. Glas-Crete (Wonder-Board), Custom Building Products, Seal Beach, CA.

2.4 METAL TRIM

A. General:
1. Comply with ASTM C1047.
2. Material: Zinc alloy or galvanized steel ; zinc alloy required for application in shower areas, exterior soffits, and locker rooms.
3. Uncoated sheet metal thickness: 26 gage minimum.
4. Flanges designed for concealment in joint compound, flange width to suit installation requirements.

B. Corner Beads at Straight Surfaces:
1. Cornerbead, Clinch-On Products, Mounds View, MN.
2. Wallboard Corner Bead, National Gypsum Company, Charlotte, NC.
3. Beadex B1XW Paper Faced Metal Outside Corner, United States Gypsum Company, Chicago, IL.

C. Edge Trim Beads:
1. L-Bead and U-Bead, Clinch-On Products, Mounds View, MN.
2. Number 100 and 200 Wallboard Casing, National Gypsum Company, Charlotte, NC.
3. B4 (L) and B9 (J) Paper Faced Metal Trim, United States Gypsum Company, Chicago, IL.

D. Control Joints:
   1. V-Shaped slot.
   2. Acceptable Products and Manufacturers:
      a. E-Z Strip Expansion Joint, National Gypsum Company, Charlotte, NC.
      b. 093, United States Gypsum Company, Chicago, IL.

2.5 JOINT TREATMENT AND ADHESIVE MATERIALS

A. Joint Compound:
   1. Comply with ASTM C475.
   2. Board manufacturer's standard ready-mixed joint compounds low-VOC joint compounds with no detectable amounts of crystalline silica based on NIOSH Method 7500.
   3. Compounds specifically manufactured for topping coats are not permitted for first coat on metal trim and taping.
   4. Mixing:
      a. Mix compounds in strict accordance with manufacturer's directions.
      b. Mix only enough at one time to be used during recommended pot life of compound.

B. Joint Reinforcement Tape for Gypsum Board: Paper reinforcing tape complying with ASTM C475.

C. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
   1. Current requirement refers to the date on which the materials are installed in the building.
   2. SCAQMD Rule #1168 referenced in section 018113 is current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
   3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

D. Adhesives and sealants shall meet or exceed the VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

2.6 SURFACING MATERIAL

A. Primer/Surfacer:
   1. Flat latex basecoat for use on surfaces located in areas of intense lighting and indicated to receive a Level 4 finish. Basecoat is in addition to primer and finish coating specified in Section 099000.
   2. Products: Subject to compliance with requirements, provide one of the following products:
      a. “Builders Solution System Interior Latex Primer/Surfacer”, A63W100; Sherwin Williams.
      b. “SHEETROCK Primer-Surfaces “Tuff-Hide; USG Corporation.

2.7 ACCESSORIES

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Backer Plates:
   1. Type: 16 gage or 0,053 inch uncoated metal thickness steel sheet, galvanized in accordance with ASTM A653, G60.
   2. Length: Sufficient to extend to nearest studs beyond maximum dimension of attached item and engage fasteners from attached item; span minimum 3 studs.
   3. Height: 6 inch minimum or higher where required to accommodate item being fastened.
   4. When manufacturer of attached item has more rigorous mounting plate requirements, comply with manufacturer's requirements.

C. Fasteners:
   1. Fasteners for Metal Framing:
      a. Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved.
      b. Comply with the gypsum board manufacturer requirements for indicated applications.
   2. Gypsum Board Fasteners:
      a. Self-drilling, self-tapping, bugle head screws conforming to ASTM C1002, length to suit application.
      b. Type S screws for 0.0329 to 0.0179 inches; 21 to 26 gage thick metal framing and furring.
      c. Type S-12 screws for 0.1046 to 0.0359 inches; 12 to 20 gage thick metal framing and furring.
      d. Type G screws for gypsum board to gypsum board.

D. Acoustical Insulation:
   1. Maximize use of recycled material with minimum of 20 percent recycled glass cullet.
   2. Use formaldehyde free materials where available.
   3. Comply with ASTM C665, Type I.
   4. Mineral or glass fiber, friction fit, without integral vapor barrier membrane.
   5. Flame spread 25 or less when tested in accordance with ASTM E84.
   6. Thickness to match wall stud depth unless noted otherwise.
   7. Fire-rated assemblies: Use products tested for fire rated assemblies.
   8. Non-fire-rated assemblies: Use 2.5 to 3 pound density glass or mineral fiber products.
   9. Acceptable Mineral Fiber Products:
      a. Acoustical Fire Batts, AFB, Roxul.
      b. Thermafiber Sound Attenuation Fire Blankets, Thermafiber LLC, Wabash, LLC
   10. Acceptable Glass Fiber Products:
      a. Sound Attenuation Batts, Owens Corning, Toledo, OH.
      b. Sound Control Batts, CertainTeed Corporation, Valley Forge, PA.
      c. Sound Control Batts, Johns Manville, Denver, CO.

E. Acoustical Sealant - Concealed Locations:
   1. Description:
      a. Non-hardening, non-drying, non-skinning, non-staining, non-bleeding, non-sag synthetic rubber.
      b. Capable of maintaining air-tight seal.
      c. For use in concealed locations not exposed to view.
      d. Specifically manufactured as acoustical sealant.
   2. Acceptable Products:
      a. Acoustical Sealant; Tremco, Inc., Beachwood, OH.
      b. BA-98 Acoustical Sealant; Pecora Corporation, Harleysville, PA.
      c. USG Firecode Sound - Smoke Sealant, United States Gypsum Company, Chicago, IL

F. Acoustical Sealant - Exposed Locations:
   1. Description:
      a. ASTM C834.
      b. Non-sag, non-staining, non-bleeding, and paintable.
      c. Joint movement range without cohesive/adhesive failure: Plus 7.5 percent to minus 7.5 percent of joint width.
      d. Color: As selected by Architect from manufacturer's standard colors [Custom color].
   2. Acceptable Products:
      a. AC-20, Pecora Corporation, Harleysville, PA.
      b. Sonolac, Sonneborn Building Products, Shakopee, MN.
      c. Acrylic Latex, Tremco, Inc., Beachwood, OH.
      d. USG Acoustical Sealant, United States Gypsum Company, Chicago, IL.

G. Acoustical Outlet Box Pads
   1. Minimum thickness - 1/8 inch.
   2. Adhesion - adheres readily to metal or plastic.

3. Service temperature – 30 degrees to 200 degrees F.
4. Shall contain no asbestos.
5. Minimum shelf life - 1 year.
6. Non Fire Rated Products:
   a. Lowry's Outlet Box Pads as manufactured by Harry A. Lowry & Associates, Inc., Sun Valley, CA.
   b. Sound Pad #68 as manufactured by L.H. Dottie Co., City of Commerce, CA.
7. Fire Rated Products:
   a. Flamesafe FSP 1077 Putty Pads as manufactured by W.R. Grace & Co., Hartfield, PA.
   b. Putty Pads as manufactured by Specified Technologies Inc., Somerville, NJ.
   c. Hilti CP617 Putty Pads as manufactured by Hilti, Tulsa, OK.
   d. 3M Fire Barrier Moldable Putty Pads type MPP-X to fit box size as manufactured by 3M, St. Paul, MN.
   e. Metacaulk ® Putty Pads as manufactured by RectorSeal, Houston, TX.

H. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20.

I. Cementitious Tile Backer Units Accessories:
1. Fasteners: Corrosion resistant type required by board manufacturer for securing units.
2. Joint Reinforcement Tape:
   a. 2 inch nominal width.
   b. Polymer coated fiberglass mesh of type recommended by board manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify rough-in utilities and blocking are in proper position.

3.2 PREPARATION

A. Items Which Require Backer Plates or Blocking:
1. Coordinate sizes and locations.
2. Install additional studs for attachment of backer plates and blocking in required locations to receive surface mounted accessories as indicated or as required by accessory manufacturer.
3. Elimination of backer plates and blocking is not permitted.
4. Direct attachment of items to studs is not permitted.

3.3 FRAMING INSTALLATION

A. General:
1. Install in accordance with manufacturer's printed instructions, except for more stringent requirements of these specifications.
2. Install units plumb, level, square, and free from warp and twist while maintaining dimensional tolerances and alignment with surrounding construction.
3. Installation Tolerances:
   a. Ceilings: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.
   b. Partitions:
      1) Maximum variation from true position: 1/8 inch.
      2) Maximum variation of any member from plane: 1/8 inch in 10-0", non-cumulative.
4. Control and Expansion Joints:
   a. Do not bridge building control and expansion joints with metal framing systems.
   b. Install independent framing on each side of joints.
   c. Comply with manufacturer requirements for constructing control and expansion joints in fire-rated and shaftwall assemblies.
   d. Coordinate with installation of expansion joint covers specified in Section 079500.

B. Interface with Sprayed Fireproofing Specified in Section 078100:
   1. Before sprayed fireproofing is applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fireproofing.
   2. Where offset anchor plates are required, provide continuous units fastened to building structure not more than 24 inches apart.

C. Framing:
   1. Install in accordance with ASTM C754 and with requirements of ASTM C840 that apply to framing installation, except for more stringent requirements of manufacturer or these Specifications.
   2. Suspended Ceilings and Soffits:
      a. Install channel and cross-furring in accordance with ASTM C754.
      b. Install proprietary drywall suspension systems in accordance with ASTM C636.
      c. Coordinate location of hangers and framing with other construction above ceiling line.
      d. Install ceiling framing independent of walls, columns, and above ceiling non-structural construction, unless otherwise required by fire-rated assembly requirements.
      e. Install free from contact with insulation and other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system.
      f. Offset hangers only where required to miss obstructions; resist resulting horizontal forces by bracing, or other means.
      g. Where width of ducts and other construction within ceiling plenum produces interference with location of hangers required to support standard suspension system members:
         1) Install supplemental suspension members and hangers in form of trapezes or equivalent devices.
         2) Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
      h. Do not connect or suspend steel framing from pipes, ducts, and conduit.
      i. For proprietary grids, provide attachments and hangers from structural support above, spaced on a grid of 24 by 48 inches.
      j. Reinforce openings in framing which interrupt main runners, furring channels, and bracing. Extend reinforcing minimum of 24 inches past each end of each opening.
      k. Proprietary direct hung framing: Tie direct to suspension; interconnect components in accordance with framing system manufacturer's instructions.
      l. Space main runners at maximum 48 inches on center, unless otherwise indicated.
      m. Space furring channels at maximum 16 inches on center, unless otherwise indicated.
      n. Provide additional framing to fulfill structural requirements and for support at recessed fixtures and similar items.
      o. Laterally brace entire suspension system.
      p. Provide cross and vertical bracing with additional framing to fulfill structural and wind uplift requirements for exterior soffits.
   3. Studs and Runners:
      a. Stud Spacing: 16 inches on center, unless otherwise indicated.
      b. Runner Tracks: Provide continuous tracks sized to match studs.
      c. Where walls are indicated to extend to overhead surfaces (ceilings, deck construction, and structural elements), to prevent deflection transfer of structural loads or movements to walls provide either:
         1) Insert studs into runner tracks with minimum 1/2 inch gap between end of stud and inside surface of top and bottom runner. Maintain minimum of 1/2 inch engagement between end of stud and end of legs of top and bottom runners.
         2) Slip joint between walls and structure using top runner nested within 3 inch long segment of extended leg ceiling runner positioned at stud spacing and fastened to overhead surface. Do not fasten top runner to extended leg ceiling runner.
      d. Terminate top of walls at structure above ceiling construction, unless otherwise indicated.
      e. Where walls are indicated to have framing extend only to ceiling attach ceiling runner securely to acoustical ceiling grid or ceiling framing.

f. Brace stud framing rigid which is not clad on both sides with gypsum board. Fasten 1-1/2 inch wide 20 gage galvanized steel straps vertically spaced no more than 18 inches apart with top strap no more than 6 inches from top of wall.
g. Horizontally align openings in stud webs.
h. Use full length studs vertically positioned between runner tracks.
i. Minimum Jamb Stud Framing at Door Openings:
    1) Walls laterally braced by ceiling framing or structure at 9'-0" above finish floor:
        a) Single Doors not Larger than 3'-6" by 9'-0" and not Weighing more than 275 Pounds: 2 Type 25 studs or 1 Type 20 stud.
        b) Paired Doors not Larger than 3'-6" by 9'-0" per leaf and not Weighing more than 275 Pounds per Leaf: 2 Type 20 studs or 1 Type 18 stud.
    2) Walls Laterally Braced by Ceiling Framing or Structure at 12'-0" above Finish Floor:
        a) Single Doors not Larger than 3'-6" by 9'-0" and not Weighing More than [(275 Pounds)]: 2 Type 20 studs or 1 Type 18 stud.
        b) Paired doors not larger than 3'-6" by 9'-0" per leaf and not weighing more than 275 Pounds per leaf: 2 Type 18 studs.
    3) At welded frames with fixed anchor clips, secure studs to jamb anchors clips with not less than two self tapping screws per clip.
    4) Provide wall framing above door openings to match wall framing adjoining the opening.
    5) Provide one additional stud not more than 6 inches from jamb studs.
    6) At fire-rated doors use minimum thickness of Type 20 studs, unless otherwise indicated.
    7) Comply with GA-219 for fire-rated doors.
j. Minimum Sidelight Framing:
    1) Provide 2 Type 25 studs at each jamb or provide 1 Type 20 stud at each jamb.
    2) Provide wall framing above and below window and wall openings with wall framing to match wall framing adjoining the opening.
    3) Provide 1 additional stud not more than 6 inches from jamb studs.
k. Fabricate corners with a minimum of three studs.
l. Provide additional studs and framing to support wall intersections, termination of walls, at openings and cut-outs and to support built-in anchorage and attachment devices for other work.
m. Locate studs no more than 2 inches from abutting walls, wall corners and other construction. Start typical wall studs 6 inches either side of stud reinforcing or frames.
n. Install electrical outlets and similar junction boxes at indicated locations. Provide additional blocking and straps for proper locations; do not mount on "nearest" stud.
o. Install steel studs so that flanges point in the same direction and so that leading edges or ends of each gypsum board can be attached to open (unsupported) edges of stud flanges first.

4. Shaftwalls:
    a. Position top and bottom "J" runners with short leg toward the finish side of the wall and securely fasten to the construction at both ends and at intermediate points, maximum 24 inches apart.
    b. Isolate shaftwall framing from transfer of structural loading to system, both horizontally and vertically. Provide slip or perimeter movement relief type joints in accordance with manufacturer's instructions to attain lateral support and avoid axial loading.
    c. Support elevator hoistway door operating equipment independently of shaftwall framing system.
    d. Frame opening for elevator hoistway door frame in accordance with requirements of elevator and shaftwall manufacturers.
    e. Install supplementary framing, and bracing to support fixtures, equipment, services, heavy trim, furnishing and similar work which cannot be adequately supported directly on shaftwall framing.
5. Wall furring:
    a. Install furring channels either vertically or horizontally.

b. Space furring at a maximum of 16 inches on center.
c. Fasten furring to substrate with fasteners at 24 inches on center staggered through alternate wing flanges.
d. Install corner furring channels in manner equivalent to furring on remainder of wall.

6. Backer Plates:
   a. Provide backer plate for securing surface mounted fittings, fixtures, accessories, and furnishings, including, but not limited to handrails, grab bars, toilet walls, towel bars, wall mounted door stops, and similar screw- and bolt-fastened items.
   b. Secure with sufficient quantity of self-tapping sheet metal screws to sustain loads imposed by items attached to backer plates.
7. Blocking: Coordinate with Section 061000 for installation of concealed wood blocking and furring required for securing wood trim, carpentry, woodwork, cabinets, millwork, casework, surface mounted equipment, and similar nail-fastened items.

3.4 GYPSUM BOARD INSTALLATION

A. General:
1. Comply with more stringent requirements of GA 216, ASTM C840, manufacturer, and these Specifications.
2. Install gypsum board in accordance with GA 600 for fire-rated assemblies.
3. Install gypsum board panels with face side out.
4. Use boards of maximum length to minimize end joints.
5. Abut boards without forcing; neatly fit ends and edges of board and do not place butt ends against tapered edges with gap between adjacent panels no greater than 1/16 inch. Hold bottom of board 1/4 inch above floor.
6. Support ends or edges of board directly on framing or furring members.
7. Joint Staggering:
   a. Ceilings: Stagger end joints not less than one framing member.
   b. Walls: Stagger vertical joints on opposite side of walls to occur on alternate framing members.
   c. Fire-Rated Assemblies: Comply with fire-rated assembly design requirements for joint staggering.
8. Do not locate gypsum board joints within 12 inches of external corners of windows, doors, or other such openings, except when control joints are installed at corners.
9. Cut openings in board with no greater than 1/4 inch gap around electrical outlets, plumbing, light fixtures, piping and other similar penetration items and small enough to be covered by plates and escutcheons; coordinate size of gap around penetrations in fire-rated assemblies with firestopping requirements of Section 078400.
10. Do not install imperfect, damp and damaged boards.
11. In concealed spaces above ceilings where designated walls extend full height to structure above, install boards in full coverage on both faces of framing system for fire, sound, air, and smoke-rated walls.
12. Fit gypsum panels around ducts, pipes, and conduits.
13. Where walls intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4 to 1/2-inch wide joints to install sealant.
14. In concealed spaces above ceiling where designated chase walls extend full height to structure above, install boards in full coverage on one face of framing system. Fasten horizontal stud or 1-1/2 inch wide 20 gage galvanized steel straps vertically spaced no more than 36 inches apart with top strap no more than 6 inches from top of wall.
15. Attach gypsum panels to steel studs so that leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
16. Attach gypsum panels to framing provided at openings and cutouts.
17. Isolate perimeter of non-load-bearing gypsum board walls at structural abutments, except floors, as detailed. Provide 1/4 to 1/2-inch wide spaces and trim edges with LC-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant for exposed locations.

18. Control and Expansion Joints: Gypsum Association Publication GA 234. Use for fire-resistance rated and for non-fire-rated conditions.
    a. Spacing: In accordance with GA 234.
    b. Do not bridge building control and expansion joints with gypsum board.. Utilize details shown in referenced standard.
    c. Terminate gypsum board on each side of joints.
    d. Comply with manufacturer requirements for constructing control and expansion joints in fire-rated and shaftwall assemblies.
        1) Locate studs on both sides of joints. Attach two layers of gypsum board strips to back of one stud to fill area behind joint; provide continuous fire barrier behind joint without restricting movement.
    e. Coordinate with installation of expansion joint covers specified in Section 079513.

B. Fasteners:
1. Attachment Methods:
    a. Attach board to framing and furring with screws.
    b. Attach board to board with screws.
2. Except where indicated otherwise or where required for fire rated assemblies, space fasteners in compliance with more restrictive requirements of referenced installation standards or manufacturer's requirements.
3. Attach board to supplementary framing and blocking which provide additional support at openings and cutouts.

C. Ceilings:
1. Place with long edge perpendicular to orientation of furring or framing members.
2. In double layer application, secure both layers with fasteners; adhesive application of second layer not acceptable.

D. Single Layer Wall Installation: Install vertically in manner which will minimize end-butt joints, unless specific orientation is required by fire-rating design.

E. Double Layer Wall Installation:
1. Install gypsum board for base layer, place long edge parallel to framing or furring members, unless specific directional requirement is established by fire-rating design.
2. Install gypsum board for face layer, place parallel to base layer with offset joints, unless specific direction is required by fire-rating design.
3. Secure base layer with fasteners.
4. Secure face layer with fasteners or adhesive supplemented with fasteners, except where fire rated assemblies require only fasteners.

F. Shaftwalls:
1. Install gypsum liner panels between framing members in accordance with manufacturer requirements.
2. For double layer gypsum board finish, fasten base layer vertically over studs. Install face layer vertically over base layer with joints staggered, screw attached through base layer into studs.
3. Finish face layer joints as specified for "Gypsum Board Treatments."

3.5 SOUND ASSEMBLIES

A. Resilient Channels:
1. Space at a maximum of 16 inches on center.
2. Locate joints over framing members.

B. Gypsum Board:
1. Fasten gypsum board to resilient channels between framing members supporting resilient channels.
2. Do not use fasteners whose length is longer than depth of resilient channels.

C. Acoustical Insulation:
1. Install acoustical insulation in walls where indicated.
2. Place insulation for full distance of space between studs for full coverage of sound-rated assembly.

3. Fit insulation tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind walls and tight to items passing through walls.

D. Acoustical Sealant:
1. Seal with continuous bead at gypsum board edges on both faces of walls which receive acoustical insulation.
2. Seal perimeter of face layer in single layer assemblies using acoustical sealant for exposed locations.
3. Seal perimeter of base layer in double layer assemblies using acoustical sealant for concealed or exposed locations.
4. Seal openings and cutouts; fill open spaces between board and fixtures, cabinets, ducts and other flush or penetrating items using acoustical sealant for exposed locations.
5. Seal behind control and expansion joints using acoustical sealant for concealed or exposed locations.
6. Electrical Boxes:
   a. Seal sides and backs of to completely close off openings and joints.
   b. Seal joint between boxes and board.
7. Setting track in sealant bead, in lieu of applying sealant to gypsum board panels, is not permitted.

E. Acoustical Outlet Box Pads:
1. Install outlet box pads over all junction boxes within all partitions and gypsum board ceilings containing sound insulation including but not limited to demising walls, corridor walls, walls adjacent to stairwells, shafts, etc.
2. Use fire rated box pads where required to maintain the fire rating of the partition, wall or ceiling assembly.
3. Install box pads according to manufacturer's written instructions.
4. Brush or wipe construction dust and dirt from box surface. If surface is contaminated with oil, etc., wipe with Xylene or Toloulene to remove residue.
5. Center outlet box pad on the back of the junction box. Mold around conduit and cable entering the box. Mold cover around box sides covering all openings and press firmly into place.

F. Intersections with Non-Sound-Rated Assemblies:
1. Extend sound-rated construction to completely close sound flanking paths through non-sound-rated construction.
2. Install acoustical sealant for exposed locations at joints between face layers at vertical interior angles of intersecting assemblies.

3.6 TRIM INSTALLATION

A. Install trim flush using longest practical length; miter corners and intersections.

B. Secure flanges by taping compound, screws, stapling, or clinching in accordance with manufacturer's instructions.

C. Install corner beads at visually-exposed external corners, unless otherwise indicated.

D. Install edge trim where edge of board would be exposed or semi-exposed and where board abuts dissimilar materials.

E. Control Joints: Coordinate placement and locations with Architect prior to commencement of work. Install control joints where indicated on Drawings and additionally in accordance with following:
1. Locate at joints of maximum stress, at points of natural weak planes, such as at openings and at corners of offsets in walls exceeding 30'-0" in length.
2. Extend control joints from both corners of door frames to top of wall where doors occur in long runs of wall.
3. Where gypsum board is vertically continuous, as at stairwells and other long vertical wall areas, provide horizontal control joints at each floor level at top runner of shaftwall, at slip joints in shaftwall framing, and breaks in shaftwall framing.
4. Locate in ceilings with area exceeding 900 square feet, where framing or furring changes direction, and spaced apart not more than 30'-0".

5. Locate in ceilings where wings of "L", "U", and "T" shaped areas are joined.
6. Provide mineral fiber acoustical insulation or gypsum panel backing at control joints in fire-rated assemblies to maintain fire rating.

3.7 GYPSUM BOARD TREATMENTS

A. General:
1. Apply joint treatment to gypsum board joints (both directions); flanges of corner beads, edge trim, and control joints; penetrations; fasteners; surface defects; and elsewhere to prepare surfaces for decoration and specified levels of gypsum board finish.
2. Comply with manufacturer requirements for hardening and drying of joint treatment prior to application of succeeding coats.

B. Prefill: Fill open joints, rounded and beveled edges, and damaged areas, flush with adjoining surfaces using prefill compound.

C. Apply joint tape over gypsum board joints and to architectural metal trim with concealed face flanges as required by architectural metal trim manufacturer and as required to prevent cracks from developing in joint compound at flange edges.

D. Finish moisture-resistant to comply with board manufacturer's directions.

E. Levels of Finish:
1. Comply with GA-214; italicized commentary is excluded; replace words "may" and "should" with "shall."
2. Locations to Receive Level 4 Finish: Areas to be painted.
   a. In addition to GA-214, Level 4 Finish gypsum board in areas of intense lighting shall receive one coat of specified basecoat/surfacer to entire surface at manufacturer’s recommended coverage rate or mil thickness.
3. Locations to Receive Level 3 Finish: Areas to receive moisture resistant gypsum board used as a tile substrate.
4. Locations to Receive Level 2 finish:
   a. Fire-rated , sound-rated, and smoke-rated assemblies in ceiling plenums and concealed areas.
5. Locations to Receive Level 1 Finish:
   a. Non-fire-rated , non-sound-rated, and non-smoke-rated assemblies in ceiling plenums and concealed areas.

3.8 CEMENTITIOUS TILE BACKING BOARD INSTALLATION

A. Comply with ANSI A108.11

B. Use cementitious tile backer board for wall surfaces in shower and tub areas, high water or humidity exposure areas, and other locations indicated for use behind thin-set tile.

C. Install board with long edge perpendicular or parallel to framing. Hold bottom edge 1/4 inch above floor or fixture lip.

D. Maintain manufacturer's required space between board edges.

3.9 ADJUSTING

A. Adjust and align metal framing to properly receive final finishes in accordance with required tolerances.

B. Correct damages, defects, and leave work ready for decoration. Clean compounds from trim. Visible cracks, nail heads, tool marks, waves, distortions, or other similar defects shall not appear in finished work.

3.10 CLEANING

A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction.

B. Promptly remove joint compound from surfaces not intended to receive compound.

3.11 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect metal framing from damage detrimental to finished work.

END OF SECTION

SECTION 093000

TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 079200 - Joint Sealants.
   2. Section 092900 - Gypsum Board: Cementitious Tile Backing Board.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select locally or regionally fabricated products wherever possible.
   2. Select adhesives and sealants meeting LEED requirements.
   3. Adhesives and sealants shall meet the more stringent VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.
   4. Use sealers that comply with the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for each product.

C. Shop Drawings:
   1. Show perimeter conditions and junctions with dissimilar materials.
   2. Indicate and detail expansion and control joints.

D. Samples:
   1. Tile: Submit tile samples for each type, color and size.
   2. Grout: Submit samples mounted in 6 inch long metal channels for each type and color selected.
   3. Waterproofing membrane: Submit 12 by 12 inch sample.
   4. Threshold: Submit full profile sample, 6 inches long, of each type.

E. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Manufacturer's and installer's qualification data.
   3. Manufacturer's instructions.

F. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Maintenance data. Include stain removal methods.

G. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Mortars, Grouts, and Adhesives.
   2. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
      a. Mortars, Grouts, and Adhesives.
   3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Latex modified setting mortars/adhesives
      b. Latex Modified Grout
      c. Joint Filler and Sealants (per 079200)
      d. Sealant Primers (per 079200)

1.3 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Obtain each type and color tile material required from single source.
   2. Obtain setting and grouting materials from one manufacturer to ensure compatibility.
   3. Obtain waterproofing membrane from same manufacturer as setting material or from manufacturer approved by setting material manufacturer to ensure compatibility.

B. Manufacturer Qualifications:
   1. Tile: Minimum 5 years experience in manufacture of tile products.
   2. Setting materials: Minimum 10 years experience in manufacture of setting and grout materials specified.
   3. Waterproofing membrane: Minimum 5 years experience in manufacture of membrane materials specified.

C. Installer Qualifications: Specializing in tile work having minimum of 5 years successful documented experience with work comparable to that required for this Project.

D. Floor Tile Slip Resistance: Comply with ANSI A137.1, 2012 edition Dynamic Coefficient of Friction AcuTest of 0.42 wet as tested with BOT-3000 Universal Walkway Tester.

E. Certifications:
   1. Submit "Master Grade Certificate" for each type of ceramic and quarry tile in accordance with requirements of ANSI A137.1.
   2. Submit manufacturer's certifications that mortars, adhesives and grouts are suitable for intended use.

1.4 FIELD SAMPLES

A. General: Comply with provisions of Section 014500.

B. Sample Installation:
   1. For final review of each type tile, construct sample panel of approximately 100 square feet.
   2. Install in location as directed by Architect.
   3. Show workmanship of finished work and construction techniques.

1.5 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.

C. Meeting Agenda includes but is not Limited to:
   1. Surface preparation.
   2. Tile and installation material compatibility.
   3. Elastomeric membrane.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Labeling: Comply with ANSI A137.1

C. Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type and grade.

D. Protect materials from contamination, dampness, freezing, or overheating in accordance with manufacturer's instructions.

E. Broken, cracked, chipped, stained, or damaged tile will be rejected, whether built-in or not.

F. Protect mortar and grout materials against moisture, soiling, or staining.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.

B. Maintain continuous and uniform building temperatures of not less than 50 degrees F during installation.

C. Ventilate spaces receiving tile in accordance with material manufacturers' instructions.

1.8 EXTRA STOCK AND MATERIALS

A. Deliver 1 percent of installed tile for each type, size, and color.

B. Store at Project site where directed. Ensure materials are boxed and identified by manufacturer, type and color.

PART 2 - PRODUCTS

2.1 TILE

A. As determined by Architect.

2.2 SETTING BED MATERIALS

A. Portland Cement With Latex Additive; Thick-Set:
   1. Portland Cement: ASTM C150, Type I, from one source only, non-staining and non-air-entraining.
   2. Mortar Sand: ASTM C144, free of deleterious materials, well graded.
   3. Setting Bed Sand: ASTM C136, 100 percent passing No. 4 sieve.
   4. Latex Additive:
      a. Description: Latex additive serving as replacement for gauging water, for use with site mixed portland cement mortar.
      b. Quantity: As recommended by latex additive manufacturer to produce workable consistency.
      c. Acceptable Products:
         1) Laticrete 3701 Mortar Admix with Laticrete 226 Thick Bed Mortar Mix, Laticrete International
         2) Planicrete AC, Mapei Corporation, Garland, TX.
         3) CustomCrete Latex Mortar Admix, Custom Building Products, Seal Beach, CA

B. Polymer Modified Thinset Dryset Mortar:
   1. Description: One or two component system; factory prepared second generation high bond strength dryset mortar and polymer additive; complying with ANSI A118.15.
   2. For use at interior and exterior conditions, thermal and shock proof.
   3. Provide white mortar and proper formula for use with unbacked glass tile.
   4. Acceptable Products:
      a. Laticrete 254 Platinum, Laticrete International.
      b. UltraFlex 3, Mapei Corporation, Garland, TX.
      c. MegaFlex Crack Prevention Mortar, Custom Building Products, Seal Beach, CA

C. Large Format Medium-Bed Mortar: Factory prepared latex modified mortar; ANSI A118.4 and A118.11.
   1. Medium Bed Thickness: 3/8 to 3/4 inch thick floor and non-sag wall installations.
   2. Shear Bond Strength: ANSI A118.4 based on Porcelain Tile; Minimum 300 psi at 28 days
   3. Premium-grade, multipurpose medium-bed and nonsag wall applications.
   4. Furnish with antimicrobial additives.
   5. Color: Gray.
   6. Acceptable Products:
      a. Laticrete 4-XLT, Laticrete International.
      b. UltraFlex LFT, Mapei Corporation.
      c. Marble, Granite & Travertine Premium Medium Bed Mortar, Custom Building Products, Seal Beach, CA.

2.3 GROUTS

A. Latex-Modified Sanded Grout:
   1. Description: Latex-modified, factory blended, mildew resistant, sanded, grout consisting of portland cement, graded quartz and additives; for interior and exterior conditions, thermal shock resistant; comply with ANSI A118.7.
   2. Latex Additive: Integral in mix type as recommended by latex mortar manufacturer.

3. Color: As selected from manufacturer's full color line.
4. Acceptable Products:
   a. Laticrete PermaColor Grout.
   b. Keracolor S, Mapei Corporation.
   c. Polyblend Sanded Grout, Custom Building Products, Seal Beach, CA.

B. Unsanded Latex-Modified Grout for Wall Tile:
1. Description: Latex-modified, factory blended, mildew resistant, non-sanded, grout consisting of portland cement and additives; comply with ANSI A118.7.
2. Latex Additive: Integral in mix type as recommended by latex mortar manufacturer.
3. Location: Use at wall tile joints less than 1/8-inch.
4. Color: As selected from manufacturer's full color line.
5. Acceptable Products:
   a. PermaColor Grout, Laticrete.
   b. Keracolor U, Mapei Corporation.
   c. Polyblend Non-Sanded Grout, Custom Building Products, Seal Beach, CA.

C. Latex-Modified Sanded Grout:
1. Description: Latex-modified, factory blended, mildew resistant, sanded, grout consisting of portland cement, graded quartz and additives; comply with ANSI A118.7.
2. Latex Additive: Type as recommended by latex mortar manufacturer.
3. Color: As selected from manufacturer's full color line.
4. Acceptable Products:
   a. Laticrete 1500 Sanded Grout with Laticrete 1776 Grout Admix.
   b. Keracolor S, Mapei Corporation.
   c. Polyblend Sanded Grout, Custom Building Products, Seal Beach, CA.

D. Unsanded Latex-Modified Grout for Wall Tile:
1. Description: Latex-modified, factory blended, mildew resistant, non-sanded, grout consisting of portland cement and additives; comply with ANSI A118.7.
2. Latex Additive: Type as recommended by latex mortar manufacturer.
3. Location: Use at wall tile joints less than 1/8-inch.
4. Color: As selected from manufacturer's full color line.
5. Acceptable Products:
   a. Laticrete 1600 Unsanded Grout with Laticrete 1776 Grout Admix.
   b. Keracolor U, Mapei Corporation.
   c. Polyblend Non-Sanded Grout, Custom Building Products, Seal Beach, CA.

2.4 WATERPROOFING MEMBRANES AND SHOWER PANS

A. Elastomeric Waterproofing Membrane:
1. Description: Manufacturer's proprietary elastomeric compound formulated for use as heavy-duty, reinforced waterproof membrane for tile floors.
2. Accepted by IAPMO and ICC for use as shower pans
3. Meet or exceed ANSI A118.10.
4. Acceptable Products:
   a. Laticrete 9235, Laticrete International, Bethany, CT.
   b. Mapelastic 315, Mapei Corporation, Elk Grove Village, IL.
   c. Custom 9240 Waterproofing and Anti-Fracture Membrane, Custom Building Products, Seal Beach, CA.

B. Shower Base Kit: Cement mortar bed and curb substitute, pre-sloped at 2% grade to drain. High density R EPS material encapsulated in a fiber mesh and epoxy finish. Curbs and flanges pre-attached, coated in liquid waterproofing membrane.
1. RedGuard Shower Base, Custom Building Products.
2. Kerdi-Shower Kit, Schluter.

2.5 ACCESSORIES

A. Thresholds: Honed marble, Georgia White, full width of frame opening, depth as required to accommodate setting system, 3/4 inch minimum thickness unless otherwise detailed, beveled two directions, and radius edges at intersection of bevels to vertical face.

B. Joint Fillers and Sealants:
   1. Provide in accordance with Section 079200 - Joint Sealants.
      a. Vertical Surfaces: Urethane—Multi-Component or Silicone—Sanitary as appropriate and compatible with tile.
      b. Horizontal Surfaces: Urethane—Traffic-Bearing.
   2. Color: Match grout.
   3. Ensure sealant is chemically compatible with tile, mortar, and grout.
   4. Ensure sealant can physically and chemically withstand environmental conditions normally expected at installation areas.

C. Adhesives & Sealants (including grouts): Only use adhesives and sealants (grouts) in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
   1. Current requirement refers to the date on which the materials are installed in the building.
   2. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
   3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
   4. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
   5. Sealants shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

D. Prefabricated Edge:
   1. Prefabricated aluminum edge.
   2. Size: Height as required by tile by 8 foot lengths.
   3. Aluminum: Clear anodized.
   4. Acceptable Product and Manufacturers:
      a. CTC Edge, Ceramic Tool Company, Milwaukee, WI.
      b. Trims, Schluter System Inc., Plattsburgh, NY.

E. Primers: As recommended by manufacturer of mortar, grout, crack isolation, and sealant materials.
   1. Use primers that comply with the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

F. Substrate Fillers and Sealers: Materials as recommended by manufacturers of setting materials.

G. Grout Sealers: Water based silicone sealer, clear, VOC compliant, non-yellowing formula, to protect grout from staining.
   1. Use sealers that comply the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
   2. Acceptable Products:
      a. Laticrete 190 Grout Sealer.
      b. Miracle Sealants Grout Sealer.
      c. Grout Sealer, Aqua Mix.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify that substrates comply with TCNA tolerance requirements.

3.2 PREPARATION

A. Clean substrates.

B. Prepare surfaces in strict accordance with instructions of manufacturer whose setting materials or additives are being used.

C. Acid Based Cleaners: Use not permitted.

D. Scarify concrete substrates with blast track equipment if necessary to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Clean and maintain substrate in condition required by setting material manufacturer.

E. Do not seal substrate unless required by manufacturer.

F. Prime substrate when required by manufacturer.

G. Membrane:
1. Install membrane in accordance with Section 017300.
2. Flash membrane up adjacent walls and restraining surfaces.
3. Allow membrane to cure prior to setting tile.
4. Do not allow construction traffic on membrane.

3.3 INSTALLATION

A. General:
1. Install tile materials in accordance with ANSI A108 series, other referenced ANSI and TCNA specifications, and TCNA "Handbook for Ceramic Tile Installation", except for more stringent requirements of manufacturer or these Specifications.
2. Pattern: As indicated. Layout tile work and center tile fields in both directions in each space or on each wall area.
3. Lay out tile to minimize cutting and to avoid tile less than half size.
4. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size.
5. Cut and fit tile at penetrations through tile. Do not damage visible surfaces. Carefully grind edges of tile abutting built-in items. Fit tile at outlets, piping and other penetrations so that plates, collars, or covers overlap tile.
6. Extend tile work into recesses and under or behind equipment and fixtures, to form complete covering without interruptions, except as otherwise indicated. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
7. Accurately form intersections and returns.

B. Cementitious Tile Backing Board:
1. Refer to Section 092900 for installation of cementitious tile backing board.
2. Verify cementitious tile backing board installed for wall surfaces in shower and tub areas, high water or humidity exposure areas, and other locations indicated for use behind thin-set tile.
3. Fill joints by applying tile setting material and joint reinforcement.
4. Set top of tiles flush with each other. Exposed face offset between adjacent tiles (lippage); 3/64 inch maximum.

C. Thin-Set Method:
1. Apply mortar with notched trowel using scraping motion to work material into good contact with surface to be covered.
2. Apply only as much mortar as can be covered within 20 to 30 minutes or while surface is still tacky.
3. Trowel small quantity of mortar onto back (back-butter) of each tile.
4. Set tiles in place and rub or beat with small beating block.
5. Beat or rap tile to ensure proper bond and also to level surface of tile.
6. Align tile to show uniform joints and allow to set until firm.
7. Clean excess mortar from surface of tile with wet cloth or sponge while mortar is fresh.

D. Shower and Floor Drains: Coordinate installation of drains with Division 22.

E. Threshold:
1. Install at exposed tile edges at doors, unless otherwise indicated.
2. Use same setting material as used for adjacent field tile.

F. Grouting And Pointing:
1. After tile has set sufficiently, fill joints with grout until flush with surrounding tile.
2. Point joints full and remove excess grout. Clean tile thoroughly.
3. Install sealant in vertical wall joints at interior corners.
4. Install tile with maximum 25 percent variation of specified grout joint width.

G. Expansion Joints:
   1. Keep expansion joints free of mortar and grout.
   2. Provide expansion joints directly over changes in material, over control and expansion joints in substrate, at juncture of floors and walls, at other restraining surfaces such as curbs, columns, bases, and wall corners, and where recommended by TCNA EJ171 Expansion Joint requirements.
   3. Install sealant in expansion joints.
   4. Provide sealant material at items penetrating tile work, unless otherwise indicated.
   5. Provide sealants and related materials in accordance with cited ANSI and TCNA requirements.

3.4 ADJUSTING

A. Sound tile after setting. Replace hollow sounding units.

3.5 CLEANING

A. Clean tile surfaces in accordance with manufacturer's instructions.

B. Clean excess mortar from surface with water as work progresses. Perform cleaning while mortar is fresh and before it hardens on surfaces.

C. Remove grout haze in accordance with grout manufacturer requirements. Do not use acids for cleaning.

3.6 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Prevent wheel and foot traffic from using newly tiled floors for at least 72 hours after installation.

C. Where temporary use of new floors is unavoidable, supply large, flat boards or plywood panels for walkways over kraft paper.

D. Protect work so that it will be without any evidence of damage or use at time of acceptance.

3.7 SCHEDULES

A. Floor Tile Installation Schedule:
   1. Thin Bed Floor Tile System:
      a. Description: Thin set.
      b. Location: Refer to finish schedule
      c. Tile Type: Refer to Operator specifications.
      d. Mortar: Polymer Modified Thinset Dryset Mortar.
      e. Grout: Latex-modified.
      f. TCNA system: F113 and F113A.
   2. Thin Bed Floor Tile System:
      a. Description: Thin set.
      b. Location: Refer to finish schedule.
      c. Membrane: Elastomeric.
      d. Tile Type: Refer to Operator specifications.
      e. Mortar: Polymer Modified Thinset Dryset Mortar.
      f. Grout: Latex-modified.
      g. TCNA system: F122 and F122A.

B. Wall Tile Installation Schedule:
   1. Interior Wall Tile System:
      a. Description: Interior partitions using gypsum board.
      b. Location: Refer to finish schedule
      c. Tile: Refer to Operator specifications
      d. Mortar: Polymer Modified Thinset Dryset Mortar.
      e. Grout: Sanded or Unsanded latex-modified based on grout joint size.
      f. TCNA System: W243.

2. Interior Wall Tile System:
   a. Description: Shower walls using cementitious backer board and waterproofing membrane, prefabricated receptor.
   b. Location: Refer to finish schedule
   c. Tile: Types: Refer to Operator specifications
   d. Membrane Type: Elastomeric.
   e. Mortar: Polymer Modified Thinset Dryset Mortar.
   f. Grout: Sanded or Unsanded latex-modified based on grout joint size.
   g. TCNA System: B412.

END OF SECTION

SECTION 09 34 00

WATERPROOFING-MEMBRANE TILING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes provisions and procedures governing the furnishing and installation of chlorinated polyethylene (CPE) composite sheet waterproofing system over sloping course at bathrooms and where indicated.

B. The Work of this Section shall be in accordance with manufacturer's published instructions and recommendations.

C. Provide acceptance testing for installed waterproofing membranes.

1.2 SYSTEM DESCRIPTION

A. Completed system shall include a complete and watertight waterproofing membrane and flashing system, and all other ancillary waterproofing work as indicated.

B. Specification is based on Noble Company system and components for a thin set tile waterproofing, vapor barrier and crack isolation system.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

B. ANSI A108.13 Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.

C. ANSI A118.10 Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.

D. ASTM C-627 - Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: At least two working days prior to starting the application of the waterproofing system, conduct and coordinate a preinstallation meeting at the Project site with Owner, Building Envelope Engineer, Installer including personnel directly responsible for the installation, manufacturer's representative, and installers whose work interfaces with or affects the Work of this Section including installers of accessories.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.6 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installing contractor shall be a Noble Corporation trained and authorized installer having a minimum of 5 years demonstrable experience.

B. Use qualified workers thoroughly skilled and experienced in current ANSI A108 standards and Tile Council of America (TCA) recommendations.

C. Contractor crew must be trained and have current experience (less than 6 months since previous project) in the installation of Noble Corporation TS systems.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery, storage and handling of materials shall be in accordance with manufacturer's published instructions.

1.9 FIELD CONDITIONS

A. Comply with bonding agent manufacturer's recommended procedures for hot or cold weather. The following requirements do not override the Contractor's responsibility to follow manufacturer's written installation instructions.

B. Bonding Adhesive Ambient Conditions:
   1. Adhesive shall be maintained between 65 degrees and 100 degrees F for 24 hours prior to and following installation.

C. Waterproof Sealant Ambient Conditions:
   1. Store sealant below 85 degrees F.
   2. Temperature Use Range: -65 degrees to 122 degrees F

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard lifetime warranty in which manufacturer agrees to replace waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight due to rotting, cracking or microorganism deterioration.

B. Installer's Warranty: Installer shall warranty the installed assembly remains watertight and water vapor tight for a period of 10 years after Owner acceptance. The warranty shall provide for removal and replacement of all overburden as necessary to repair defective waterproofing system installation. Replacement finishes shall exactly match those removed to repair the waterproofing assembly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Composite sheet waterproofing consisting of non-plasticized chlorinated polyethylene (CPE) flexible synthetic elastomer with non-woven polyester scrim on both sides. Subject to compliance with requirements, provide Noble Company; NobleSeal TS.

B. No other manufacturer is considered an equal.

C. Provide auxiliary materials from the same manufacturer as composite sheet waterproofing. The following are Basis of Design auxiliary materials to be used with the Basis of Design CPE membrane:
   1. Sheet Membrane Drain Flashing: NobleFlex Drain Flashing
   2. Bonding Adhesive: NobleBond EXT
   3. Waterproof Sealant: NobleSealant 150
   4. Sheet Splice: Noble Weld 100

D. Drain Pipe Cleaner: Subject to compliance with requirements, provide WD-40 or approved equal.

2.2 COMPOSITE SHEET WATERPROOFING

A. Chlorinated polyethylene membrane shall meet the following requirements:
   1. Mil Thickness: 30 mils
   2. Water Vapor Transmission: 0.050 perms; ASTM E 96, Procedure E
   3. Crack Isolation: Exceeds "High Performance" criteria; ANSI A118.12
   4. System Performance: "Extra Heavy Service" 1-14 cycles; ASTM C 627
   5. Hardness: 82, shore A; ASTM D 2240
   6. Tensile Strength: 1,600 psi; ASTM D 412, Die C
   7. Elongation: 44%; ASTM D 412, Die C
   8. Tear Strength: 400 psi; ASTM D 412, Die C
   9. Shear Strength (7 day/4 week/12 week): Passed; ANSI A118.10
   10. Shear Strength – Water Immersion (7 day/100 day): Passed; ANSI A118.10

11. Fungus & Microorganism Resistance: No Growth; ANSI A118.10
12. Seam Strength: Passed; ANSI A118.10
13. Waterproofness: Passed; ANSI A118.10

2.3 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
   1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Sheet Membrane Drain Flashing: Composite made from non-plasticized Chlorinated Polyethylene (CPE) flexible synthetic elastomer with non-woven scrim on both sides.
   1. Mil Thickness: 40 Mils
   2. Membrane Flashing Depth: 1-1/2 inches

C. Weep Protector: Clear rigid PVC designed to insure drainage to weep holes.
   1. Thickness: 0.020 inches

D. Bonding Adhesive Primer: One-coat, grey tinted, penetrating aqueous acrylic polymer and film-forming sealer for use on porous concrete substrates.

E. Bonding Adhesive: Low odor adhesive for bonding waterproofing sheets and sheet flashings to substrates and projections.
   1. Zero VOCs
   2. Non-flammable

F. Waterproof Sealant: Thermoplastic elastomer base high solids sealant. Provide waterproof sealant at sheet seams, penetrations, drains, terminal edges and preformed corners.

G. Waterproofing and Sheet-Flashing Accessories: Provide preformed corners and other accessories recommended by waterproofing manufacturer for intended use.

H. Niche Flashings: Preformed pockets and other accessories factory formed for use with the Noble Corporation TS system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to verify and provide letter to state that substrates are ready to receive waterproofing membrane with no deficiency that could result in defective installation. Prepared substrates to be in accordance with ANSI A108, A3.1 and Tile Council of America (TCA) recommendations.

3.2 PREINSTALLATION TESTING

A. Conduct preinstallation testing for installation of bonding adhesive without primer.
   1. Moisture emission rate of substrate must not exceed 4 lbs./1,000 sq. ft./24 hours as measured by Anhydrous Calcium Chloride test method, ASTM F 1869.
   2. pH shall be between 5 and 9.

B. Conduct preinstallation testing for installation of bonding adhesive with primer.
   1. Moisture emission rate of substrate must not exceed 8 lbs./1,000 sq. ft./24 hours as measured by Anhydrous Calcium Chloride test method, ASTM F 1869.
   2. pH shall not exceed 11.
   3. Relative humidity shall not exceed 85%.

C. Record and provide results of preinstallation testing in writing.

3.3 PREPARATION

A. Substrate shall be flat. Use appropriate leveling product as necessary to ensure flat substrate. Remove curing compounds, surface hardeners and floor coatings that may affect the bond of the adhesive.

B. Prior to installation of membrane, clean existing drain pipes with drain pipe cleaner in accordance with membrane and drain pipe manufacturers' recommendations and written instructions.

3.4 BONDING ADHESIVE PRIMER INSTALLATION

A. Apply primer on concrete with a 3/8-inch nap roller as an even coat over the entire concrete surface. Apply one coat at a rate of 315-360 sq. ft. per gallon. Allow primer to dry for a minimum of 4 hours.

3.5 BONDING ADHESIVE INSTALLATION

A. Apply adhesive with a 3/32-inch x 3/32-inch x 3/32-inch U-notch trowel. Do not allow adhesive to skin over. If adhesive dries before placement of sheet membrane, apply additional adhesive to re-wet the initial application.

3.6 FULLY ADHERED SHEET INSTALLATION

A. Prepare surfaces and install fully adhered sheets over entire area to receive waterproofing according to manufacturer's written instructions and recommendations in ASTM D 5843.

B. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.

C. Unroll membrane into adhesive as soon as practical after spreading adhesive. Embed sheet with a handheld roller to ensure 100% adhesive transfer to bottom of sheet. Roll membrane from center out toward edges. Re-roll the membrane as required.

D. Do not apply bonding adhesive to splice area of sheet.

E. Install fully adhered sheets and auxiliary materials to tie into existing waterproofing.

F. Overlap sheets 2-inches minimum. Apply sealant in accordance with manufacturer's installation instructions. Overlap sheets and flatten with roller or by pressing with flat edge of trowel or hand roller.

G. Flashings, Upturns and Corners:
   1. Turn sheet up vertical surface 2-inches higher than flood plane.
   2. Lap Corners. Bend overlap and seal inside corner with waterproof sealant.
   3. Bond preformed corners to sheet and/or substrate with waterproof sealant.

H. Horizontal Application: Apply sheets with side laps shingled with slope of deck where possible.

3.7 FIELD QUALITY CONTROL

A. Water Test: Upon completion of waterproofing Work, plug drain(s), dam areas if necessary and fill with water. After 48 hours, inspect for leakage. Make necessary repairs and retest until watertight.

B. Inspection of testing shall be performed both visually and via the use of digital infrared imaging.

3.8 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot traffic or prolonged exposure to sunlight on unprotected membrane.

B. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 09 34 03

WATERPROOFING COATING FOR TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Sloping course under urethane coating to provide slope and eliminate ponding water.
   2. Urethane coating with tack coat under tile.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: Submit 4-inch by 2-inch samples.
   1. Cured coating, 90 dry mils thick. Provide 15 mil sand tack coat on half of the sample.
   2. Reinforcing fabric and joint cover sheet.

C. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners and other termination conditions.

D. Shop Drawings: 24x36 inch plan view shop drawings at minimum 3/16 inch per foot scale indicating slope of sloping course with slope arrows and percentages.

E. Applicator's Project References: Submit list of completed project references.

F. Certification of Applicator's Supervisor: Submit for applicator's supervisor a certificate indicating completion of manufacture's contractor training program.

G. Warranty: Submit manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Use applicator experienced in the application of the specified coating for a minimum of 5-years on projects of similar size and complexity. Provide a list of completed projects including project name and location, name of engineer, name of coating manufacturer, and approximate quantity of coating applied.

B. Applicator's Supervisor Qualifications: Employ a supervisor during all phases of the work that had successfully completed manufacturer's contractor training program.

C. Applicator's Personnel Qualifications: Employ persons trained for the application of coating.

1.4 DELIVERY, STORAGE, AND HANDLNG

A. Deliver, store and handle materials in accordance with manufacturer's written instructions and recommendations.

B. Delivery:
   1. Deliver materials to the site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
   2. Do not deliver material to site more than one month before use.

C. Storage:
   1. Store material in accordance with manufacturer's instructions.
   2. Store materials indoor in an area well ventilated and protected from damage.
   3. Do not store material near open flame, sparks, or hot surfaces.
   4. Store materials on raised platforms and covered by waterproof covers.
   5. Keep material containers closed.

D. Handling: Protect materials during handling and application to prevent damage.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not apply in wet weather or when rain is imminent.

B. Apply when the surface is a minimum 50 degrees F and a minimum of 5 degrees F above dew point. Consult manufacturer for application instructions if the ambient or surface temperature is below 50 degrees F.

C. Do not apply to porous substrates when substrate or ambient temperatures are rising.

D. Do not apply to porous substrates when substrate is in direct sunlight.

1.6 WARRANTY

A. Manufacturer's Warranty: Replace product that fails within specified warranty period.
   1. Warranty Period: Ten (10) years from the date of Substantial Completion.

B. Installer's Warranty: Installer agrees to replace components of the Work that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five (5) years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Urethane Coating: C.I.M. Industries Inc.

2.2 URETHANE COATING

A. Urethane Coating: Two-component, high solids, elastomeric asphalt modified urethane. Designed for spray, squeegee, or roller application.
   1. Product: Subject to compliance with requirements, provide CIM 1000.
   2. Color: Black.

B. Primer: Two-component, high solids, epoxy primer. Use as a primer coat on dry, porous substrates such as concrete.
   1. Product: Subject to compliance with requirements, provide CIM EMT Epoxy Primer.

C. Patching Material: Liquid applied, chemical and corrosion resistant urethane elastomer, chemically thickened to allow trowel application with minimum sag. Use as a crack filler and for application to vertical surfaces and cold joints.
   1. Product: Subject to compliance with requirements, provide CIM 1000 Trowel Grade.
   2. Color: Black.

D. Reinforcing Fabric and Joint Cover Sheet: Stitch bonded polyester. Compatible with coating materials.
   1. Product: Subject to compliance with requirements, provide CIM Scrim.

2.3 SLOPING COURSE

A. Sloping Course: Polymer modified Portland cement Mortar. Subject to compliance with requirements, provide SikaTop 122 Plus.

PART 3 - EXECUTION

3.1 GENERAL

A. Prepare substrates, apply materials and protect materials in accordance with manufacturer's written instructions and recommendations.

B. Ensure substrates are of load bearing capacity and free from all potential bond breakers including dirt, dust, grease, oil, sealers, curing compounds, laitance, loose or deteriorated concrete and any bond-inhibiting foreign substances.

C. Obtain a firm, sound concrete surface.

3.2 EXAMINATION

A. Examine substrate and adjacent areas where coating will be applied. Notify the Waterproofing Consultant of conditions that would adversely affect the application or subsequent utilization of the high coating. Do not proceed with application until unsatisfactory conditions are corrected.

3.3 PROTECTION

A. Protect adjacent work and surrounding areas from contact with coating.

3.4 SLOPING COURSE GENERAL

A. Mechanically prepare surfaces to receive sloping course to a surface profile of CSP 5-7.

B. Mix and install sloping course in accordance with manufacturer's written instructions and recommendations.
   1. Install where required to provide slope.
   2. Install where required to eliminate low spots, bird baths, and ponding water.

C. Ensure substrate is clean and dry in accordance with manufacturer's instructions.

D. After installation of sloping course, moist cure with wet burlap and polyethylene, a fine mist of water or manufacturer-recommended, water-based compatible curing compound.
   1. Moist curing shall commence immediately after finishing, and shall continue for a minimum of 48 hours.
   2. Protect applied material from sun, rain, and wind until compressive strength is 70 percent of the 28-day compressive strength.
   3. Protect applied material from freezing by covering with insulating material.

E. Allow sloping course to cure prior to application of urethane coating.

3.5 SLOPING COURSE INSTALLATION

A. Mixing: Mechanically mix in an appropriate sized mortar mixer, or with a mud paddle and drill at approximately 400-600 rpm.
   1. Pour approximately 4/5 gallon of Component A into the mixing container. Add Component B while continuing to mix. Mix to a uniform consistency for a maximum of three minutes.
   2. Add remaining Component A to mix for desired consistency.
   3. Mix only as much material as can be completely placed in 10-15 minutes.
      a. Horizontal Application: Mix only as much material as can be completely placed in 30 minutes
   4. Do not retemper material.
   5. Should smaller quantities be desired, be sure that components are mixed in the manufacturer's recommended ratios and that Component B is uniformly blended before mixing the components together.

B. Placement: Prepare the substrate at the time of application to "saturated surface dry" with no standing water.
   1. Mortar must be scrubbed into the substrate, filling all pores and voids.
   2. While the scrub coat is still plastic, force material against the edge of repair, working toward the center of the area.
      a. If the repair area is too large to fill while the scrub coat is still wet, use the specified epoxy resin/portland cement adhesive in lieu of the scrub coat as a bonding bridge.
   3. After filling, consolidate, then screed.
   4. Allow mortar to set to the desired stiffness, then finish to match adjacent surface texture.
      a. Smooth surface: Use trowel to create smooth surface texture.
      b. Rough surface: Use wood float or sponge float for rough surface texture.
   5. Horizontal areas, where the depth of repair to sound concrete is greater than 1 inch, add manufacturer's recommended coarse aggregate.
      a. The top surface of each lift shall be scored to produce a rough surface for bond to the next lift.
      b. Each lift shall be allowed to reach final set before applying subsequent lifts.
      c. Each lift shall be scrubbed into the preceding lift.

3.6 SURFACE PREPARATION FOR CONCRETE

A. Provide clean, dry, and structurally sound concrete surface as required by the manufacturer.

B. Condition Survey: Perform a condition survey of existing concrete in accordance with ACI 201.1R.

C. Prepare concrete surface in accordance with manufacturer's written instructions.

D. Remove sharp concrete edges and projections.

E. Ensure surface is free of holes. Fully open bug holes before repair. Repair defects in the concrete surface, such as bug holes, air pockets, and honeycomb by filling and smoothing off with patching material.

F. Ensure substrate is clean and dry in accordance with manufacturer's instructions.

G. Ensure surface profile of CSP 4-6. Ensure any bugholes are fully opened and exposed to view and fill bugholes with appropriate repair material.

H. Repair cracks in concrete surface with material suitable for type and width of crack, compatible with substrate and coating, and approved by the Waterproofing Consultant.

I. Moisture Tests: Do not apply primer or coating to concrete surface unless two or more of the flowing moisture tests confirm appropriate moisture levels for properly prepared substrates:
   1. Plastic Sheet Method (ASTM D4263): Pass/Fail.
   2. Relative Humidity Test: Less than 75 percent relative humidity at 70 degrees F.
   3. Calcium Chloride Test: Less than 5 pounds per 1,000 square feet per 24 hours.
   4. Radio Frequency Test: Less than 5 percent moisture.

3.7 APPLICATION

A. Apply primer to concrete surface a minimum of 15-20 mils wet thickness. A uniform coating free of holidays or pinholes is necessary to minimize outgassing effects during the application of the coating to porous surfaces such as concrete. Surfaces may require additional coats to obtain a pinhole free finish.
   1. After primer has cured and prior to placing coating, ensure pH of primer is less than 8. Solvent wipe with methyl ethyl ketone until the pH of the cured epoxy surface is less than 8.

B. Allow primer to cure in accordance with manufacturer's instructions before topcoating with the coating.

C. Apply coating in accordance with manufacturer's instructions.

D. Keep material containers tightly closed until ready for use.

E. Keep equipment, air supplies, and application surfaces dry.

F. Mix and apply when coating is above 60 degrees F.

G. Do not use adulterants, thinners, or cutback solutions.

H. Blend and mix two-component materials in accordance with manufacturer's instructions. Do not hand mix components.

I. Maintain air supply for material spray application free of oil and water in accordance with ASTM D4285.

J. Apply coating directly to a clean and dry surface or to reinforcing fabric.

K. Apply a 6 to 12-inch wide strip of joint cover sheet over cracks over 1/8-inch wide, non-working joints, and edges. Adhere center joint cover sheet over all joints by applying a tack coat of the coating.

L. Apply sufficient coating to achieve 90 dry film thickness. Apply 1st coat immediately embed reinforcing fabric into membrane. Apply 2nd coat as soon as 1st coat is tack free. Typical tack free time is 2-4 hours at 70 degrees F. Refer to manufacturer's written instructions for recoat time for colder or warmer conditions.

M. Apply 15 mil dry film thickness tack coat as soon as 2nd coat has become tack free. Broadcast sand to refusal into top coat in accordance with manufacturer's written instructions and recommendations for bonding for surfaces to receive thin set and tile. Remove excess sand the following day.

N. If coating is not recoated during recoat window (4 hours maximum), refer to manufacturer's requirements for abrasion method needed to properly prepare existing membrane for recoating.

3.8 CURING

A. Cure coating in accordance with manufacturer's instructions.

B. Curing Time:
   1. Allow sufficient time for solvents to evaporate from the cured coating before placing into service.
   2. Allow minimum solvent release time of 24-hours to 48-hours at 60 degrees F.

3.9 FIELD QUALTIY CONTROL

A. Provide inspection services by an independent inspection firm throughout all phases of surface preparation, application, and curing of the coating.

B. Provide a passing water test (48 hours at 2 inch head of water) of waterproofing prior to installing tile.

3.10 CLEANING

A. Remove and dispose of all temporary materials used to protect adjacent work and surrounding areas.

B. Immediately remove and clean coating materials from surfaces not intended to receive the materials.

END OF SECTION

SECTION 095100

ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Suspended exposed and concealed grid ceiling system.

B. Products Furnished But Not Installed Under This Section: Anchors or inserts for suspension system.

C. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled materials.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SYSTEM REQUIREMENTS

A. Interface With Other Systems: Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, [fire-suppression system components] and partition system.

B. Structural Performance Requirements: Design and install systems to comply with code requirements for suspended acoustical ceilings in seismic zones. Include:
   1. Requirements for California under IBC Seismic Categories D,E,F.
   2. Use Heavy Duty Grid.
   3. Minimum 3/4 inch clearance from grid end to wall
   4. Minimum 2 inch perimeter molding
   5. Grid must be attached on two adjacent walls, no attachment on other two walls
   6. Perimeter T ends tied together at perimeters (Spacer/Stabilizer bar) on tees that are not attached to perimeter molding
   7. Partition attachment bracing is required to be independent from ceiling splay bracing
   8. Seismic separation joint required for areas > 2500 sq. ft. (or full height partitions)
   9. Rigid bracing required for ceiling elevation changes.
   10. Interior Suspended Ceilings, Soffits, and Bulkheads: Maintain deflection of not more than L/360 of distance between supports.

1.3 SUBMITTALS

A. General: Submit following items in accordance with Section 013300.

B. Product Data: Submit product data for each acoustical material and suspension system component.

C. Samples:
   1. Submit samples of each acoustical ceiling unit and exposed suspension component specified for review of color and texture.
   2. Show full range of texture and color expected in completed Work in each sample submission.
   3. Panel: Submit 12 inch by 12 inch samples of each type. Submit sample of field-cut tegular edge.
   4. Exposed Tees and Moldings: Submit one foot lengths of each type suspension system, including moldings.

D. Submit following Informational Submittals:
   1. Qualification Data: Installer's qualification data.

E. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Acoustical Panels
      b. Suspension System (steel)

2. LEED Credit MRc4: Provide Recycled content data for each different product type, size and manufacturer used for the following materials:
   a. Acoustical Panels
   b. Recycled content materials claims shall meet the following requirements:
      1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at www.ftc.gov/bcp/grnrule/guides980427.htm.
      2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and post-industrial content, as defined in the document referenced above, used in each product type used.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
   a. Acoustical Panels
   b. Suspension System (steel)

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in acoustical ceiling work having minimum of 3 years successful documented experience with work comparable to that indicated and specified.

B. Regulatory Requirements: Conform to local code for combustibility requirements for materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with Section 016000.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Permit acoustical materials to reach room temperature and a stabilized moisture content before installation.

B. Maintain uniform temperature of minimum 60 degrees F and humidity of 20 percent to 40 percent prior to, during, and after installation.

1.7 SEQUENCING

A. Do not install interior acoustical ceilings until space is enclosed and weatherproof, wetwork in space is completed and nominally dry, and work above ceilings is complete.

1.8 EXTRA STOCK MATERIALS

A. Furnish under provisions of Section 017800.

B. Deliver one percent of installed quantity of each type and color of panel [, tile] and suspension system component installed.

C. Store at Job Site where directed. Ensure materials are boxed and identified by manufacturer, style and color.

D. Furnish full size units, matching material installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Acoustic Panel:
      a. Armstrong World Industries, Inc., Lancaster, PA.
      b. Certainteed Ceilings, Tampa, FL.
      c. USG Interiors, Inc., Chicago, IL.
   2. Suspension System:
      a. Armstrong World Industries, Inc., Lancaster, PA.
      b. Chicago Metallic, Chicago, IL.
      c. Worthington Steel, Malvern, PA.
      d. USG Interiors, Inc., Chicago, IL.

2.2 MATERIALS

A. Maximize use of recycled materials with minimum of 50 percent by weight.

B. Acoustical Panels:
1. Panel Composition: Wet-formed mineral fiber.
2. Size: 24 by 24 inches.
3. Thickness: 5/8 inch.
4. Light Reflectance: 0.83.
5. NRC: 0.50.
6. CAC: 35.
7. Fire Classification: Class A.
8. Joint: Lay-in.
9. Edge: Square [Beveled] [Tegular].
10. Color: White.
11. Surface Finish: Factory-applied washable vinyl latex.
12. Acceptable Products:
    a. Dune, Armstrong World Industries.
    b. Omni Panel, USG Interiors, Inc.
    c. Hytone Fissured, BPB Celotex.

C. Moisture Resistant Acoustical Panels (Kitchens and Exposed to Exterior Environment):
1. Size: 24 by 24 inches.
2. Thickness: 5/8 inch.
3. Light Reflectance: 0.80.
4. NRC: 0.58.
5. CAC: 38.
6. Fire Classification: Class A.
7. Joint: Lay-in.
8. Edge: Square.
9. Color: White.
10. Surface Finish: Ceramic and mineral fiber composite.
11. Acceptable Product:
    a. Fine Fissured Armatuff, Armstrong World Industries.
    b. Fine Textured Clean Room ClimaPlus, USG.

D. Exposed Suspension System:
1. Grid: ASTM C635, heavy duty, exposed T; wide-face; steel capped; double-web; interlocking components; butt-edge cross tees.
2. Grid Materials: Cold-rolled steel with galvanized coating.
3. Grid Finish: White baked-on enamel. Provide aluminum caps for grid used with Moisture Resistant Acoustical Panels.
4. Acceptable Products:
    a. Prelude XL, Armstrong World Industries, Inc., Lancaster, PA.
    b. 211, Chicago Metallic, Chicago, IL.
    c. DX 24, USG Interiors, Inc., Chicago, IL.

E. Suspension System Accessories:
1. Manufacturer's standard trim and edge moldings to suit suspension system requirements; same finish as suspension system.
2. Provide edge moldings to fit penetrations exactly, including circular penetrations.
3. Provide hold-down clips, splices and stabilizer bars required for suspended grid system.

F. Attachment Devices:
1. General: Size devices for 5 times loads imposed by complete system.
2. Hanger Wire Form Inserts: No. 6 galvanized wire loop and 26 gage galvanized shell, or 14 gage galvanized steel strap with 5/16 inch hole.
3. Hanger Anchorage Devices: Screws, clips, bolts, or other devices applicable to indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven though standard construction practices or by certified test data.
4. Hangers: As recommended by manufacturer and as required to comply with structural classification.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

3.2 INSTALLATION

A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's instructions and CISCA "Ceiling Systems Handbook.".
   1. Install system in accordance with ASTM C636, except for more stringent requirements of manufacturer or these specifications.
   2. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580.
   3. CISCA Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies."

B. Install system capable of supporting imposed loads with maximum deflection of 1/360.

C. Hanger Installation:
   1. Coordinate location of hangers with other work.
   2. Secure hangers or rods as required to structural support by connecting directly to structure where possible, otherwise connect to inserts, clips or other anchorage devices or fasteners.
   3. Space hangers not more than 6 inches from each ceiling edge.
   4. Provide sufficient additional hangers for support of fixtures and other items supported by ceiling suspension system to prevent eccentric deflection or rotating of supporting runners. Provide hangers on crossrunners within 6 inches of grid intersections to support light fixtures.
   5. Hang system independent of columns, ducts, pipes, and conduit.
   6. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
   7. If ducts or other equipment prevent the regular spacing of hangers, provide trapeze or supplementary support members to span extra distance.
   8. Where building expansion joints occur, provide non-continuous independent suspension support on each side of joint. Bridge joint with expansion joint trim.

D. Center system on room axis leaving equal border units.

E. Edge Molding Installation:
   1. Install edge moldings where ceilings abut walls, partitions or other penetration elements.
   2. Miter cut inside and outside corners to provide flush, tight, hairline joints.

F. Panel Installation:
   1. Install in level and uniform plane; free from twist, warp and dents.
   2. Rest edges on flanges of tees.
   3. Support perimeters on wall moldings.
   4. Neatly scribe and cut boards for accurate fit at borders, interruptions, and penetrations by other work.
   5. Lay directional patterned units one way with pattern parallel to longest room axis.

G. Site Tolerances:
   1. Level completed assembly to tolerance of 1/8 inch in 10 feet.
   2. Variation from Plumb of Grid Members Caused by Eccentric Loads: Two degrees maximum.

3.3 CLEANING

A. Clean exposed surfaces of exposed metal ceiling grid, trim, and edge moldings. Comply with manufacturers' instructions for cleaning and touchup of minor finish damage.

B. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION

SECTION 096500

RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. This project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled materials.
   2. Verify if any product has any recycled content.
   3. Select locally or regionally fabricated products wherever possible.
   4. Verify if a local plant (within 500 miles of jobsite) can supply the product.
   5. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
   6. Adhesives and sealants shall meet or exceed the VOC and chemical component limits of SCAQMD and Cal-GREEN VOC Limit requirements.
   7. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) and Cal-GREEN VOC Content Limits for Architectural Coatings.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product information for each product.
      a. Include information for accessories and other required components.
      b. Include color charts for finish indicating manufacturer’s full range of colors available for selection.

C. Samples:
   1. Illustrate: Style, pattern, color, and size.
   2. Initial selection:
      a. Quantity: One
      b. Manufacturer’s full range of pattern and color chip samples of each type for Architect’s initial selection.
      c. Size: 4 inches square, minimum.
   3. Verification of Selection:
      a. Quantity: Four
      b. Tile: Submit actual tile unit.
      c. Wall Base: Submit 12 inch lengths.
      d. Trim Components: Submit 12 inch lengths.

D. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Installer's qualification data.
   3. Manufacturer's Instructions:
      a. Application temperature and humidity range.
      b. Floor moisture content range.
      c. Bond and moisture test procedures including frequency and duration.
      d. Special procedures.
      e. Perimeter conditions requiring special attention.

E. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Maintenance data. Include polishing/waxing information.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Vinyl Composition Tile (VCT)

b. Sheet Flooring
c. Resilient base.

2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of recycled materials based on material cost per weight for the following materials:
   a. Vinyl Composition Tile (VCT)
   b. Sheet Flooring
   c. Resilient base.
   d. Recycled content materials claims shall meet the following requirements:
      1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at www.ftc.gov/bcp/grnrule/guides980427.htm.
      2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and post-industrial content, as defined in the document referenced above, used in each product type used.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
   a. Vinyl Composition Tile (VCT)
   b. Sheet Flooring
   c. Resilient base.
4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
   a. Adhesives and sealants
5. LEED Credit EQc4.2: Submit paint and coating VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Submit the product manufacturer's most current VOC emissions data:
   a. Primers
6. LEED Credit EQc4.3: Provide FloorScore documentation demonstrating that all hard surface flooring submitted for installation are FloorScore certified and meet most current VOC emissions data:
   a. Vinyl Composition Tile (VCT)
   b. Resilient base.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type, color, and pattern of resilient flooring products from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Installer Qualifications:
   1. Acceptable to manufacturer with experience on at least 5 projects of similar nature in past 5 years.

C. Regulatory Requirements:
   1. Comply with local regulations controlling use of volatile organic compounds for installation products.
   2. Slip resistance: ASTM D2047, minimum static coefficient of friction; 0.6 for floors, 0.8 for ramps.

D. Certifications:
   1. Manufacturer's certification that products furnished for project meet or exceed specified requirements.
   2. Installer Certification: Manufacturer's certification attesting that Installer is trained and approved for application of materials.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Deliver materials to Job Site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color, and design.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Maintain minimum air and subfloor temperature required by adhesive manufacturer in spaces to receive products for at least 72 hours prior to installation, during installation, and for not less than 48 hours after installation.
   2. Store products in spaces where they will be installed for at least 72 hours before beginning installation to achieve temperature stability.
   3. Do not install products until they are at same air and subfloor temperature as space where they are to be installed.
   4. After installation, maintain minimum air and subfloor temperature of [(55 degrees F)] in areas where work is completed.

1.6 SEQUENCING

A. Sequence work under provisions of Section 011000.

B. Install products after other finishing operations, including painting, have been completed.

C. Do not install resilient products on top of concrete slabs until they are cured and are sufficiently dry to achieve bond with adhesive as determined by resilient material manufacturer's recommended bond and moisture test.

D. Coordinate installation of resilient base, reducer strips, and transition strips with installation of Carpet.

1.7 MAINTENANCE

A. Maintenance Materials:
   1. Furnish under provisions of Section 017800.
   2. Furnish extra tile, and resilient base in quantity equal to 2 percent of total material furnished but not less than:
      a. One unopened box of tile for each 50 boxes or fraction thereof installed of resilient tile of each type, pattern and color.
      b. 50 feet of each type and color base installed.
      c. 6 of each inside and outside molded corners matching base.
      d. Resilient Base: Provide in roll form of each different composition and color installed.
   3. Store at job site where directed. Ensure boxes are identified by manufacturer, pattern, style, and color.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Vinyl Composition Tile Manufacturers:
   1. Armstrong Floor Division, Armstrong World Industries, Inc., Lancaster, PA.
   2. Allstate Rubber Corp., Ozone Park, NY
   3. Azrock Industries, Inc., Florence, AL.
   4. Tarkett, Inc., Parsippany, NJ.

B. Acceptable Detectable Warning Tile Manufacturer: Flexco Company, Tuscumbia, AL.

C. Acceptable Resilient Base Manufacturers:
   1. Armstrong Floor Division, Armstrong World Industries, Inc., Lancaster, PA.
   2. Allstate Rubber Corp., Ozone Park, NY
   3. Burke/Mercer Products Company, Inc., Eustis, FL.
   4. Johnsonite, Chagrin Falls, OH.
   5. Roppe Corporation, Fostoria, OH.

D. Acceptable Trim Component Manufacturers:
   1. Flexco Company, Tuscumbia, AL.
   2. Burke/Mercer Products Company, Inc., Eustis, FL.

3. Johnsonite, Chagrin Falls, OH.
4. Roppe Corporation, Fostoria, OH.

2.2 MATERIALS

A. Vinyl Composition Tile:
1. Description:
   a. ASTM F1066.
      1) Composition: 1 (Non-Asbestos Fibers)
      2) Class: 2 (Through Pattern Tile).
   b. Size: 12 by 12 by 1/8 inch.
   c. Colors: Selected by Architect from manufacturer's full range of colors.
2. Acceptable Products:
   a. Standard Excelon— Imperial Texture, Armstrong World Industries, Inc., Lancaster, PA.
   b. Premium Excelon— Stonetex, Armstrong World Industries, Inc., Lancaster, PA.
   c. Premiere, Azrock Industries, Inc., Florence, AL.
   d. Basic Structures,, Tarkett, Inc., Parsippany, NJ.

B. Resilient Base:
1. Description:
   a. ASTM F1861.
      1) Type: TS (Rubber).
      2) Style: Straight, toe-less type for carpet areas; set-on type with standard toe for other areas.
   b. Thickness: 0.125 inch minimum.
   c. Height: 4 inches nominal.
   d. Provide in roll form to accommodate installation with minimum seaming.
   e. Corners: Field fabricated.
   f. Colors: Selected by Architect from manufacturer's full range of colors.
2. Acceptable Products:
   a. Rubber Base, Armstrong World Industries, Inc., Lancaster, PA.
   b. Rubber Base, Johnsonite, Chagrin Falls, OH.
   c. Rubber Base, Mercer Products Company, Inc., Eustis, FL.
   d. Rubber Base, Roppe Corporation, Fostoria, OH.

2.3 TRIM COMPONENTS

A. Resilient Flooring Reducer Strip:
1. Description:
   a. Material: Homogeneous vinyl or rubber composition.
   b. Width: 1 inch, minimum.
   c. Align flush with top of resilient flooring on side of strip.
   d. Tapered or bullnose edge on side opposite of resilient flooring.
   e. Colors: Selected by Architect from manufacturer's full range of colors.
2. Acceptable Products:
   a. Tile Reducer Strip No. 92, Flexco Company, Tuscumbia, AL.
   b. RRS-XX-C Series, Johnsonite, Chagrin Falls, OH.
   c. Tile Reducer No. 633, Burke/Mercer Products Company, Inc., Eustis, FL.
   d. Reducer Strip No. 172, Roppe Corporation, Fostoria, OH.

B. Carpet Reducer Strip:
1. Description:
   a. Material: Homogeneous vinyl or rubber composition.
   b. Profile: Fabricate to accommodate 5/16 inch glue-down carpet and carpet tile accommodate tackless carpet installation.
   c. Width: (2 inch, minimum.
   d. Align flush with top of carpet on side of strip.
   e. Tapered or bullnose edge on side opposite of carpet.
   f. Colors: Selected by Architect from manufacturer's full range of colors.

2. Acceptable Products:
   a. Deluxe Reducer Strip No. 78, Flexco Company, Tuscumbia, AL.
   b. EG-XX-G Series, Johnsonite, Chagrin Falls, OH.
   c. Super Imperial Reducer No. 705, Burke/Mercer Products Company, Inc., Eustis, FL.
   d. Carpet Reducer Strip No. 174, Roppe Corporation, Fostoria, OH.

C. Transition Strip:
1. Description:
   a. Tapered overlapping cap shape for transition from 1/8 inch thick resilient flooring to 1/4 inch thick carpet.
   b. Material: Homogeneous vinyl or rubber composition.
   c. Cap Width: 1 inch, minimum.
   d. Align flush with top of flooring on each side of strip.
   e. Colors: Selected by Architect from manufacturer's full range of colors.
2. Acceptable Products:
   a. Adapter CTA-XX-A, Johnsonite, Chagrin Falls, OH.
   b. Joiner No. 150, Burke/Mercer Products Company, Inc., Eustis, FL.
   c. Joiner No. 177, Roppe Corporation, Fostoria, OH.

2.4 ACCESSORIES

A. Leveling, Patching and Underlayment Compounds:
1. Cementitious types required by resilient flooring manufacturer; gypsum based compounds not allowed.
2. Capable of being extended to a feather-edge.
3. Capable of sustaining loads without indentation
4. Vapor retarder underlayment: Underlayment compound having a moisture permeance no greater than 1 perm.

B. Primers and Adhesives:
1. Waterproof.
2. Materials required by resilient product manufacturer for particular product and substrate moisture content and condition.
3. Removable adhesive with antimicrobial additive; approved by resilient product manufacturer.
4. Use primers that comply the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
5. LEED Requirements - LEED Credit EQc4.1 - Adhesives and Sealants shall meet low VOC content as determined by LEED requirements; VOC content shall not exceed 50 grams/liter.
6. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
   a. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
   b. Sealants shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.
   c. Current requirement refers to the date on which the materials are installed in the building.
   d. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

C. Polish:
1. Materials required by manufacturer for particular flooring product.
2. Capable of providing a minimum slip resistant coefficient of friction value of 0.8 determined in accordance with ASTM D2047.
3. LEED Requirements - LEED Credit EQc4.2 - Paints and Coatings shall meet low VOC content as determined by LEED requirements; VOC content shall not exceed 150 grams/liter.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Site Verification of Conditions:
   1. Verify that concrete floor moisture content, alkalinity, carbonization, and dusting are within floor manufacturer's limitations.
   2. Verify that floor and wall surfaces to receive flooring and base are free of substances which may adversely affect adhesive and resilient materials.

3.2 PREPARATION

A. Comply with ASTM F710.

B. Bond and Moisture Tests:
   1. Perform in accordance with flooring manufacturer's requirements to determine suitability of concrete subfloor for receiving resilient flooring with regard to moisture content and curing compounds.
   2. Test concrete slabs in accordance with ASTM F710 to ensure moisture content is 3 percent or less.
   3. Test with calcium chloride in accordance with ASTM F1869 to ensure vapor transmission rate less than 4 pounds per 1000 sq. ft.
   4. Submit report to Owner. If subfloor's moisture vapor permeance is in excess of flooring manufacturer's limits for issuing warranty, prepare slab and apply vapor retarder underlayment system acceptable to manufacturer, or use manufacturer's adhesive for application on substrates containing excessive moisture.

C. Remove ridges, bumps, trowel marks and protrusions from substrate.

D. Fill depressions, low spots, cracks, joints, holes, indentations, and other defects with leveling and patching compounds. Trowel to smooth, flat surface producing substrate to within tolerance of 1/4 inch in 10'-0".

E. Clean substrate to remove paint, dirt, oil, grease, sealers, release agents, hardening compounds, curing compounds, residual adhesives, and harmful substances which could impair performance of adhesive materials used with resilient products.

F. Vacuum clean substrate.

G. Prime substrate in accordance with manufacturer's requirements.

H. Unroll rolled products minimum 24 hours before installation, unless not required by manufacturer.

3.3 INSTALLATION

A. General:
   1. Comply with Section 017300.
   2. Adhesive:
      a. Apply with notched trowel at rate and in pattern required by manufacturer.
      b. Gun application is not permitted.
      c. Apply to provide continuous bond between resilient material and substrate. Do not allow adhesive to bleed through joints.
      d. Spread only enough adhesive to permit installation of materials before adhesive's initial set.
      e. Allow solvent to flash off and adhesive to become tacky in accordance with manufacturer's requirements before applying resilient product.
   3. Scribing:
      a. Produce tight hairline joints.
      b. Scribe to walls, columns, cabinets, floor outlets, floor penetrations, and other appurtenances.
      c. Scribe, cut and fit exposed edges at adjoining construction and neatly abut.

B. Flooring—General:
   1. Set in place, press with roller to attain full adhesion and eliminate air bubbles and wrinkles. Use roller of weight required by resilient flooring manufacturer.
   2. Extend unexposed edges under set-on bases and similar trim work.
   3. Terminate at centerline of door openings where adjacent floor finish is dissimilar.
   4. Extend into closets and offsets and under movable equipment of rooms and spaces indicated or scheduled to receive flooring, including recessed covers within those spaces.
   5. At casework modules install flooring underneath without interrupting flooring pattern.

C. Tile Flooring:
   1. Comply with manufacturer's installation requirements to match color, texture, and pattern by random selection of tile from different cartons and lots.
   2. Lay tile symmetrically about center line of room or space. Adjust so edge units are not less than one-half of tile width.
   3. Lay tile with bottom surface securely bonded to substrate and top surface left smooth, clean, and free of imperfections.
   4. Fit tiles tightly so each unit is in contact with surrounding tiles and joints aligned.
   5. Joint Pattern: Checkerboard with joints aligned in both directions in square pattern Align as indicated.
   6. Where resilient tile flooring meets thin-set ceramic tile or other similar hard surface flooring of higher elevation, install underlayment compound such that surfaces of both flooring materials are at same elevation.

D. Resilient Base:
   1. Use longest lengths possible; pieces less than 10 feet long are not permitted. Seams are not permitted between wall corners spaced less than 10 feet apart.
   2. Fit joints straight, tight, and vertical.
   3. Install on solid substrate backing.
   4. Bond tight to wall and floor surfaces.
   5. Scribe to door frames and other interruptions.
   6. Outside Corners: Wrap base around corner after using cove base groover tool by Gundlach to make V-shaped vertical cut in back of base at corner.
   7. Inside Corners:
      a. Butt and cope, or mitered [Use corner units].
      b. Do not wrap base around corners.
   8. Align tops of adjacent sections.
   9. Change from cove base to straight base at flooring transition strips.

E. Reducer and Transition Strips:
   1. Provide reducer strips at unprotected edges, exposed edges, and where flooring and carpet terminates.
   2. Provide transition strips at transitions from resilient flooring to carpet.
   3. Center strip under door where flooring terminates at door openings.
   4. Install in longest lengths practicable with minimal joints.
   5. Fit joints tightly.
   6. Secure resilient strips to subfloor by using adhesive.

3.4 CLEANING

A. Immediately remove excess adhesive from surfaces without damage.

B. Replace scuffed, scratched, broken, and discolored products.

C. Re-install loose products.

D. Clean surfaces in accordance with manufacturer's requirements. Do not use materials and methods which may damage finish and surrounding construction.

E. Polish Application:
   1. Comply with flooring and polish manufacturers' requirements.
   2. Comply with flooring manufacturer's requirements regarding scheduling of initial cleaning and application of polish.
   3. Apply first coat of polish as required by flooring manufacturer.

4. Near completion of project and just prior to final inspection:
   a. Clean flooring and apply second coat of polish.
   b. Buff thoroughly with mechanical buffers.

3.5 PROTECTION

A. Protect in accordance with Section 017300.

B. Prohibit traffic on floor finish for minimum of 72 hours after installation.

C. Protect work from damage from subsequent construction operations so there will be no indication of use and damage at time of acceptance.

END OF SECTION

SECTION 096623

RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. This project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled materials.
   2. Verify if any product has any recycled content.
   3. Select locally or regionally fabricated products wherever possible.
   4. Verify if a local plant (within 500 miles of jobsite) can supply the product.
   5. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
      a. Adhesives and sealants shall meet the more stringent VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.
      b. Sealers: Only use sealers in the building that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1.2 SYSTEM REQUIREMENTS

A. General: In addition to requirements shown or specified, comply with applicable provisions of National Terrazzo and Mosaic Association for design, materials, fabrication and installation of component parts.

B. Performance Requirements - Epoxy Resin:
   1. Hardness: Shore "D" Durometer Hardness of 60-85, ASTM D2240.
   2. Tensile strength: 3000 psi minimum, ASTM D638, test rate of 0.2 inches per minute using C die described in ASTM D412.
   3. Compressive strength: 10,000 psi minimum, ASTM D695, specimen B, cylinder.
   4. Chemical resistance: When tested in accordance with ASTM D1308, 7 day immersion, following substances shall have no deleterious effect: mineral oil, isopropanol, ethanol, 10 percent hydrochloric acid, 30 percent sulfuric acid, 5 percent acetic acid, 0.025 percent detergent, 1 percent soap solution, 10 percent sodium hydroxide and distilled water.

C. Performance Requirements - Epoxy Terrazzo consisting of resin mixed in accordance with manufacturer's recommendations and blended with marble aggregate, ground and grouted with epoxy resin, and cured for 7 days shall meet following minimum requirements:
   1. Flammability: Self-extinguishing, Class A, extent of burning 0.25 inch maximum, ASTM D635.
   2. Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per degree F maximum with temperature range between -12 and 140 degrees F, ASTM D696.
   3. Bond Strength: 200 psi minimum tensile strength with 100 percent concrete failure when tested in accordance with Field Test Method for surface soundness and adhesion as described in ACI Committee No. 403 Bulletin Title No. 59-43.
   4. Coefficient of Friction (Slip Resistance): 0.60 minimum without sealer for leather soles in dry state.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit copies of National Terrazzo and Mosaic Association, Inc. (NTMA) data for divider, control and expansion joint strips.

C. Shop Drawings: Submit layout drawings for divider strips, border strips, and control joint strips. Show detail for divider strip intersections.

D. Samples:
   1. Submit samples minimum 12 by 12 inches for each color and type of terrazzo.

2. Show color, chip size and variation, and matrix color with divider strip and ground top surface.
3. Submit 6 inch length of each type and kind of divider strip, stop strip, and control joint strip.

E. Submit following Informational Submittals:
1. Test Reports: Written results of testing specified as part of Field Quality Control article.
2. Certifications specified in Quality Assurance article.
3. Qualification Data: Manufacturer's and applicator's qualification data.
4. Manufacturer's instructions.
5. Manufacturer's field reports.

F. Closeout Submittals:
1. Submit under provisions of Section 017800.
2. Maintenance data: Manufacturer's and NTMA printed cleaning and maintenance instructions.
3. Warranty: Submit specified warranty.

G. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
a. Epoxy Terrazzo
2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
a. Epoxy matrix
b. Aggregates.
c. Recycled content materials claims shall meet the following requirements:
1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at www.ftc.gov/bcp/grnrule/guides980427.htm.
2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and pre-consumer content, as defined in the document referenced above, used in each product type used.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
a. Epoxy matrix
b. Aggregates.
c. Metal accessories
4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
a. Adhesives and primers
5. LEED Credit EQc4.3: Submit Floorscore certificate for VOC Emissions Data for the following materials. Submit the product manufacturer’s most current VOC emissions data:
a. Epoxy terrazzo

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Not less than 5 years of successful experience in manufacture of specified terrazzo materials.
2. Submit at least 5 satisfactory installations in which materials proposed for use on this Project have been in service for at least 3 years.

B. Installer Qualifications:
1. Member of the National Terrazzo and Mosaic Association, Inc. (NTMA) or certified to perform work in accordance with NTMA standards.
2. Certified in writing by terrazzo manufacturer as qualified for specified systems.

C. Certifications:
   1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
   2. Submit installer and manufacturer's written acceptance of substrate.

1.5 FIELD SAMPLES

A. General: Comply with requirements of Section 014500.

B. Sample Installation:
   1. Provide field sample of 100 square feet of terrazzo flooring, including divider strips and border.

1.6 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Minimum Agenda:
   1. Discuss sequence and scheduling, installation procedures and interface with other trades.
   2. Review requirements and conditions which could possibly interfere with successful performance of work.
   3. Review Project Specifications and Drawings.
   4. Establish acceptable concrete substrate requirements and remedial measures for cracks.
   5. Review environmental and ventilation requirements.
   6. Review warranty conditions and verify manufacturer's acceptance of conditions.
   7. Review installation procedures, including:
      a. Substrate joint and terrazzo joint locations.
      b. Mixing requirements for terrazzo.
      c. Thickness and levelness tolerances.
      d. Finishing requirements.
      e. Review inspection, testing, and quality control procedures.
      f. Review protection requirements for construction period beyond terrazzo installation.
      g. Establish timing of manufacturer's field inspections.
   8. Conduct tour of concrete substrate areas and report on areas that are detrimental to proper terrazzo installation or appearance. Include proposed remedies to inappropriate substrates.

1.7 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 016000.

B. Deliver materials in manner to prevent damage to containers and bags. Store materials in clean dry location.

C. Label bags legibly with correct name and size of aggregate chip.

D. Store materials in accordance with manufacturer's instructions in clean and dry location with temperature between 50 and 90 degrees F.

E. Keep products away from fire or open flame.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Do not install terrazzo when substrate temperature is below 50 degrees F or above 90 degrees F.
   2. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of flooring.
   3. Ventilate area where flooring is being installed. Post and enforce "NO SMOKING" and "NO OPEN FLAME" signs until flooring has cured.

1.9 SEQUENCING

A. Do not install more terrazzo than can be ground during optimum curing period.

1.10 WARRANTY

A. Provide warranties in accordance with of Section 017800.

B. Provide written warranty jointly signed by manufacturer and installer warranting work to be free from defective materials and workmanship, and agreeing to replace components which fail within 2 years from date of Substantial Completion. Failed materials and workmanship includes spalling, cracking, and delamination.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. No. 1100 Epoxy Terrazzo Floor System over No. 3552 Epo-Flex Primer, General Polymers, Cincinnati, OH.
2. Dex-O-Tex Cheminert Epoxy Terrazzo Flooring System over SC Membrane, Crossfield Products Corp., Rosselle Park, NJ.
3. Novaclad over Selbaflex, Selby-Ucrete Flooring, Cleveland, OH.
4. Stoneblend ETZ over Stoneproof ME7, Stonhard, Stoncor, Maple Shade, NJ.

2.2 MATERIALS

A. Epoxy:
1. Packaged, two component resin and hardener, non-volatile, thermosetting, mineral filler and color pigment specially formulated for use in epoxy terrazzo flooring meeting Specification and NTMA requirements.
2. Color: As selected by Architect.

B. Surface Aggregate:
1. Material: Crushed marble, mixture of No. 1 and No. 2 size aggregate, and pigmented powder in accordance with NTMA formulations specifically selected for uniform coloration.
2. Hardness: Ha 10 minimum, ASTM C241.
3. Absorption: Not to exceed 0.75 percent in 24 hours.
4. Color: As selected by Architect.
5. Furnish chips free from deleterious or foreign matter.
6. Dust Content: Less than 1 percent by weight.
7. Label bags legibly with name and size of chip.

C. Finishing Grout: Resin or other compound with filler and pigments, as recommended by epoxy manufacturer.

2.3 ACCESSORIES

A. Epoxy Primer: Flexible, crack-suppressing, waterproof membrane/primer manufactured by epoxy terrazzo manufacturer to prevent telegraphing of cracks in concrete through face of terrazzo.

B. Primers, Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
1. Current requirement refers to the date on which the materials are installed in the building.
2. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
4. Adhesives and sealants shall meet the more stringent VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

C. Flexible Crack Suppression Membrane:
1. Epoxy flexible membrane with fiberglass scrim.
2. Acceptable Product: General Polymers, 3552 EPO-FLEX Flexible Epoxy Membrane or similar membrane compatible with proposed system.

D. Stop and Divider Strips: L type, 16 B & S gage, white alloy of zinc, depth as required.

E. Control Joint Strips: Back-to-back L type strips `16 B & S gage, white alloy of zinc, with removable filler and backer rod for sealant application between side strips, depth as required.

F. Expansion Joints: Refer to Section 079500 for covers required at building expansion joints.

G. Stop and Strip Adhesive: Setting materials as recommended by manufacturer for this use.

H. Anchoring Device: Configuration or attachment to produce secure system of anchoring strips to floors.

I. Subfloor Filler: Type as recommended by epoxy manufacturer.

J. Terrazzo Cleaner: pH factor between 7 and 10, free from crystallizing salts or water soluble alkaline salts, acid free, silicate free, biodegradable and phosphate free.

K. Sealer:
1. Colorless, non-yellowing, clear penetrating liquid type to completely seal matrix surface.
2. Not detrimental to terrazzo components.
3. Produce slip-resistant surface.
4. pH factor between 7 and 10.
5. Flashpoint: 80 degrees F minimum, ASTM D56.
6. Sealers: Only use sealers in the building that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

2.4 MIXES

A. Terrazzo Selection: Matrix color and aggregate chips to match approved sample installation.

B. Proportions: Accurately measured ratio in accordance with epoxy manufacturer's recommendations.

C. Mixing:
1. Charge and mix aggregate chips and epoxy with integral color pigment in accordance with epoxy supplier's recommendations.
2. Thoroughly mix until uniformly distributed throughout mix.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify vapor barrier was installed in accordance with Section 072600 for slab on or below grade.

C. Examine Areas to Receive Terrazzo For:
1. Defects in substrate that may affect proper execution of terrazzo work.
2. Deviations beyond allowable tolerance for concrete slab work.
3. Surface curing agents or sealers that would inhibit terrazzo bond.
4. Surface defects such as cracks that could transfer through to finished terrazzo surface if not corrected.

D. Ensure concrete has smooth trowel finish.

E. Tolerances: Ensure concrete underbed does not vary more than 1/4 inch from true plane in 10'-0". Grind concrete substrate if necessary to provide surfaces within tolerances required by NTMA for epoxy terrazzo.

F. Do not begin work until unsatisfactory conditions have been corrected.

G. Do not begin terrazzo work until concrete substrate has cured 28 days, minimum.

H. Beginning of installation means installer acceptance of substrate.

3.2 PREPARATION

A. Bond and Moisture Tests:
1. Perform in accordance with flooring manufacturer’s requirements to determine suitability of concrete subfloor for receiving terrazzo flooring with regard to moisture content and curing compounds.

2. Test concrete slabs in accordance with ASTM F710 to ensure moisture content is 3 percent or less.
3. Test with calcium chloride in accordance with ASTM F1869 to ensure vapor transmission rate less than 4 pounds per 1000 sq. ft.
4. Ensure concrete is within NTMA recommended limits prior to terrazzo installation. Submit report to Owner. If subfloor's moisture vapor permeance is in excess of flooring manufacturer's limits for issuing warranty, prepare slab and apply vapor retarder underlayment system acceptable to manufacturer, or use manufacturer's adhesive for application on substrates containing excessive moisture.

B. Mechanically abrade (shot-blast) concrete subfloor to remove inappropriate curing agents and to open pores of concrete surfaces to allow penetration of bonding agent. Completely remove cleaning residue. Acid washing is not acceptable.

C. Repair substrate cracks in manner to prevent telegraphing of defect through to finished terrazzo surface in accordance with manufacturer's written instructions. Prime concrete cracks and treat cracked area with epoxy reinforced with open weave fiberglass tape.

D. Clean area to receive terrazzo of loose chips and foreign matter.

E. Prime entire area with flooring manufacturer's fluid-applied epoxy primer/crack suppression membrane.

3.3 INSTALLATION

A. General: Place in accordance with NTMA and manufacturer's printed instructions and approved shop drawings to match approved field sample.

B. Subfloor:
1. Securely place stop, control, and divider strips on concrete subfloor.
2. Set joint strips where indicated. Set control joint strips precisely above construction or control joints in subfloor.
3. Use continuous strips with as few joints as possible. Use control joint strips to form borders.
4. Carefully butt or miter strips to prevent gaps between adjacent strips.
5. Thoroughly clean and prepare subfloor in accordance with epoxy manufacturer's instructions.

C. Terrazzo:
1. Prime subfloor in accordance with epoxy manufacturer's instructions.
2. Place terrazzo between divider strips in sufficient thickness to provide 3/8 inch thick terrazzo after grinding.
3. Trowel mixture to level of top of strips.
4. Seed trowelled surface with additional chips in same proportion as contained in terrazzo mix and trowel.
5. Machine trowel to uniform tight surface showing tops of divider strips.
6. Construction Tolerances: Limit variation in terrazzo surface from level to [1/4 inch in 10 feet].

D. Curing:
1. Cure epoxy terrazzo until topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding.
2. Do not allow traffic on floor during curing period.

E. Finishing:
1. Finish terrazzo to NTMA requirements.
2. Produce terrazzo finish surface to match approved field sample. Ensure 70 percent minimum chip exposure.
3. Rough Grinding:
   a. Grind with 24 or finer grit stones or with comparable diamond plates.
   b. Follow initial grind with 80 or finer grit stones.
4. Grouting:
5. Cleanse with clean water and rinse thoroughly.
6. Remove excess rinse water and allow to dry.
7. Machine or hand apply grout to fill voids completely.

a. Allow grout to cure.

8. Fine Grinding:
   a. Grind with 120, and then 400 or finer grit stones until all grout is removed from surface; match approved sample.
   b. Upon completion, terrazzo shall show minimum of 70 percent aggregate chips.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:
   1. Comply with requirements of Section 014000.
   2. Notify manufacturer prior to start of terrazzo installation and make arrangements for manufacturer's technical representative to be present during first day's work to advise installer of proper procedures and precautions for material use and verify work is being conducted in accordance with manufacturer's recommendations.
   3. Provide on-going inspection at predetermined intervals to ascertain installation procedures are being maintained and to verify warranty requirements.

B. Field Test Reports:
   1. Submit test report on pH value of concrete substrate. Clearly indicate if reported pH is acceptable.
   2. Submit manufacturer's field reports of installation.
   3. Submit summary reports within 4 days after each inspection.

3.5 CLEANING

A. Thoroughly wash surfaces with neutral cleaner, complying with sealer manufacturer's instructions.

B. Rinse with clean water and allow surface to dry thoroughly.

3.6 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Apply sealer immediately after cleaning in accordance with manufacturer's directions.

C. Do not permit traffic over finished terrazzo surfaces.

END OF SECTION

SECTION 096713

ELASTOMERIC LIQUID FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete: Subfloor curing compounds.
   2. Section 079200 - Joint Sealants: Expansion joints.
   3. Division 22 - Plumbing: Drains.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort. Meet or exceed VOC limits for adhesives, paints, composite wood products, and carpet systems.
      a. Floor coatings must meet or exceed VOC limits of South Coast Air Quality Management District Rule #1113.
   2. Select locally or regionally fabricated products wherever possible.
   3. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1.2 SYSTEM DESCRIPTION

A. Design Requirements: Verify concrete slab is properly prepared to receive coating system.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for each product.
   1. Include data to indicate chemical, solvent, and detergent resistance.
   2. Include information for primer, sealants, waterproofing, accessories and other required components.
   3. Include color charts indicating manufacturer's standard colors available.
   4. Include sample of warranty customized for this Project.

C. Samples: Submit samples 4 x 4 inch in size illustrating color, texture, and thickness.

D. Informational Submittals: Submit following packaged separately from other submittals:
   1. Test Reports: Written results of testing specified as part of Field Quality Control article.
   2. Certifications specified in Quality Assurance article.
   3. Qualification Data: Manufacturer's and applicator's qualification data.
   4. Manufacturer's instructions.
   5. Manufacturer's field reports.

E. LEED Data: Provide special submittals conforming to Section 018113 – LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Floor Coatings
   2. LEED Credit EQc4.2: Provide paint VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Floor Coatings.

F. Closeout Submittals: Submit following in accordance with Section 017800.
   1. Maintenance data.
   2. Warranty: Submit specified warranty.

3. LEED Credit EQc4.2: Coating Quantities: Submit documentation on quantity of each coating used on Project.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish products from one manufacturer for entire Project, unless otherwise acceptable to Architect.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years experience.

C. Applicator Qualifications: Acceptable to manufacturer with experience on at least five projects of similar nature in past five years.

D. Testing: Section 014500. Employ independent testing agency to conduct moisture vapor transmission testing.

E. Certifications: Submit following:
1. Manufacturer's certification that products furnished for Project meet or exceed specified requirements.
2. Installer’s and manufacturer's written acceptance of substrate.

1.5 FIELD SAMPLES

A. General: Comply with Section 014500.

B. Sample Installation: Provide field sample of 100 square feet of flooring, including 3 feet of base.
1. Show surface finish and construction techniques.
2. Accepted Field Sample: May remain part of completed Work.

1.6 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 013100.

B. Minimum Agenda:
1. Review Project Specifications and Drawings.
2. Establish acceptable concrete substrate requirements and remedial measures for cracks.
3. Review environmental and ventilation requirements.
4. Indoor Air Quality Procedures: Review requirements of Section 018113.
5. Review warranty conditions and verify manufacturer's acceptance of conditions.
6. Review installation procedures, including:
   a. Mixing requirements.
   b. Thickness and levelness tolerances.
   c. Finishing requirements.
   d. Review inspection, testing, and quality control procedures.
   e. Review protection requirements for construction period beyond flooring installation.
   f. Establish timing of manufacturer's field inspections.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 016000.
1. Deliver materials in manner to prevent damage to containers and bags.
2. Store materials in accordance with manufacturer's instructions in clean and dry location with temperature between 60 degrees F and 90 degrees F.
3. Keep products away from fire or open flame.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not install flooring when slab temperature is below 55 degrees F or above 90 degrees F.
2. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of flooring.
3. Ventilate area where flooring is being installed.
4. Indoor Air Quality Procedures: Ventilate in accordance with Section 018118.

1.9 WARRANTY

A. Prepare and submit in accordance with Section 017800. Provide written warranty signed by manufacturer warranting work to be free from defective materials and workmanship, and agreeing to replace components which fail within two years.
   1. Failed materials and workmanship includes spalling, cracking, and delamination.

PART 2 - PRODUCTS

2.1 MECHANICAL ROOM FLOORING

A. Urethane Flooring:
   1. General: Fluid applied, urethane elastomeric floor surfacing system.
   2. Thickness:
      a. Base Coat: 25 mil DFT.
      b. Top Coat: 15 mil DFT.
   3. Color and Finish: As selected from manufacturer's standards.
   4. Surface Texture: Slip resistant, textured top coat of type recommended or produced by manufacturer of flooring system for type and profile of desired final finish.
   5. Primer: Manufacturer's standard.
   6. VOC: Zero.
      a. LEED Requirements - LEED Credit EQc4.2 - Paints and Coatings shall meet low VOC content as determined by LEED requirements; VOC content shall not exceed 50 grams/liter.
   7. Provide manufacturer's aliphatic polyurethane topcoat where exposed to sunlight.
   8. Product and Manufacturer:
      a. Iso-Flex 760U Low-Odor Deck Coating System, LymTal International, Inc.
      b. Elastotex 500, Dex-O-Tex.
      c. GacoFlex U62, Gaco Western.

B. Use primers and coatings with VOC limits of less than 100 g/L to comply with Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

2.2 ACCESSORIES

A. Only use adhesives, primers, sealers, and epoxy materials in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
   1. Current requirement refers to the date on which the materials are installed in the building.
   2. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
   3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

B. The approved aggregates for the deck coating system shall be graded, washed and dried, 16-30 mesh silica sand, 24-mesh silicon carbide or aluminum oxide. Aggregates used depend upon which system is being used.

C. Joint Sealant Materials: Manufacturer's recommended sealant compatible with flooring system for type of service and joint condition indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.
   1. Verify vapor barrier was installed in accordance with Section 072600 for slab on or below grade.
   2. Examine areas to receive flooring for:
      a. Defects in substrate that may affect proper execution of flooring work.
      b. Deviations beyond allowable tolerance for concrete slab work.
      c. Surface curing agents or sealers that would inhibit bond.

d. Surface defects such as cracks that could transfer through to finished flooring surface if not corrected.

3. Do not begin flooring work until concrete substrate has cured 28 days, minimum. Coordinate curing methods with flooring system; ensure compatibility.
4. Do not begin work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare Substrate: Tests concrete substrate for pH and contaminants in accordance with manufacturer's recommendations. Ensure concrete is within manufacturers recommended limits prior to installation.

B. Remove ridges and bumps. Fill depressions, low spots, cracks, joints, holes, indentations, and other defects with leveling and patching compounds.
1. Mechanically abrade or shot-blast existing concrete flooring to remove inappropriate curing agents and to open pores of concrete surfaces to allow proper application of bonding agent, primer, or adhesive. Completely remove cleaning residue. Acid washing is not acceptable.
2. Repair cracks, divots and surface imperfections according to manufacturer's instructions. Rout out cracks and joints and fill with Control Joint Filler specified in Section 033000. Treat active cracks with a crack suppression membrane complying with manufacturer's requirements.
3. Clean substrate to remove paint, dirt, oil, grease, sealers, release agents, hardening compounds, residual adhesives, and substances which could impair performance of adhesive materials.
4. Broom clean and vacuum surfaces to remove dust and debris.

C. Bond and Moisture Tests:
1. Perform in accordance with flooring manufacturer's requirements to determine suitability of concrete subfloor for receiving mechanical room flooring with regard to moisture content and curing compounds.
2. Test concrete slabs in accordance with ASTM F710 to ensure moisture content is 3 percent or less.
3. Test with calcium chloride in accordance with ASTM F1869 to ensure vapor transmission rate less than 4 pounds per 1000 sq. ft.
4. Ensure concrete is within manufacturer's recommended limits prior to flooring installation. If subfloor's moisture vapor permeance is in excess of flooring manufacturer's limits for issuing warranty, prepare slab and apply vapor retarder underlayment system acceptable to manufacturer, or use manufacturer's adhesive for application on substrates containing excessive moisture.
5. Submit report to Owner.

3.3 MECHANICAL ROOM FLOORING APPLICATION

A. General:
1. Apply flooring and integral cove base in accordance with Section 017300.
2. Provide uniform monolithic wearing surface uninterrupted except where indicated or required.

B. Primer:
1. Mix and apply primer over prepared substrate at manufacturer's recommended spreading rate.
2. Coordinate applying primer with membrane to ensure optimum adhesion between flooring materials and substrate.

C. Basecoat: Integral Waterproofing Membrane:
1. Apply basecoat over primer at specified thickness.
2. Coordinate applying basecoat with primer and topping mix to ensure optimum adhesion between flooring materials and basecoat and between basecoat and substrate.

D. Flooring:
1. Mix flooring material according to manufacturer's recommended procedures.
2. Applied flooring material at specified thickness.

E. Cove Base:
   1. Apply cove base mix to wall surfaces at locations shown to form cove base height of 4 inches with 3/8 inch radius unless otherwise indicated.
   2. Round interior and external corners.
   3. Follow manufacturer's printed instructions and details including taping, mixing, priming, application, and top-coating of cove base.

F. Joint Sealants: Where substrate is interrupted by expansion or control joints, provide joint in floor coating to comply with details indicated or as recommended by flooring manufacturer.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Comply with Section 014000.
   1. Notify manufacturer prior to start of flooring installation and make arrangements for manufacturer's technical representative to be present during first day of work.
   2. Manufacturer's technical representative to advise installer of proper procedures and precautions for material use and verify work is being conducted in accordance with manufacturer's recommendations.

3.5 CURING

A. Cure flooring materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process.

3.6 CLEANING AND PROTECTION

A. Cleaning: Comply with Section 017400. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.
   1. Remove temporary covering and clean flooring prior to final inspection. Use cleaning materials and procedures recommended by flooring manufacturer.
   2. Do not permit traffic over finished flooring surfaces.

B. Protection: Protect finished work in accordance with Section 017300.
   1. Protect flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application.

END OF SECTION

SECTION 099000

PAINTING AND COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Preparation and priming of surfaces scheduled in PART 2 to receive finish coatings.
2. Painting and finish coating of exterior and interior items and surfaces, including:
   a. Exposed interior surfaces.
   b. Scheduled and otherwise identified exterior surfaces.
   c. Exposed and concealed interior and exterior mechanical and electrical equipment.
   d. Exposed interior piping, ducts, main and branch fire suppression piping, junction boxes, and conduit.
   e. Exposed items on site.
3. Exterior and interior items and surfaces not requiring painting, unless noted otherwise:
   a. Surfaces coated by other specification sections.
   b. Items with factory applied finishes.
   c. Aluminum, stainless steel, brass, bronze, chromium plate, copper, and nickel.
   d. Brick, stone, ceramic tile, plastic laminate, and precast concrete.
   e. Moving parts of operating units.
   f. Code required labels or equipment identification plates.
   g. Acoustical ceilings.
4. Field finish coating of shop or factory primed items. Refer to individual Sections for priming requirements.
5. Finish coatings schedule.
6. Preparation work and coatings specified in this Section are in addition to shop and factory applied finishes and surface treatment specified in other Sections.
7. Refer to Divisions 21, 22, 23, and 26 for painting requirements for items in dedicated mechanical and electrical spaces.
8. Paint all other items unless specifically indicated not to be painted.

B. Related Sections:
1. Division 21 – Fire Suppression: Piping identification.
2. Division 22 – Plumbing: Piping identification.
3. Division 23 – Heating, Ventilating, and Air Conditioning: Mechanical identification.
4. Division 26 – Electrical: Electrical identification.

C. This Project is a US Green Building Council LEED™ – NC project.
1. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
2. Paints and Coatings must meet or exceed the VOC and chemical component limits of Green Seal requirements.
3. Select locally or regionally fabricated products (within 500 miles of jobsite) wherever possible.
4. Use coatings that comply with the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1.2 DEFINITIONS

A. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.

B. Exposed Surfaces: Surfaces of products, assemblies, and components visible from any angle after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.

C. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or all of product or assembly.

D. Inaccessible Spaces: Spaces not intended for human use.

E. Spaces listed below are defined as "Concealed" or "Inaccessible":
1. Space between suspended ceilings and floor or roof construction above.
2. Inside furred spaces.
3. Inside of partitions.
4. Mechanical and electrical items enclosed within casework or equipment.
5. Foundation spaces.
6. Crawl spaces.
7. Trenches and manholes.
8. Mechanical shafts or chases.
9. Enclosed elevator shafts [unless visible through glass panels].
10. Utility tunnels.

F. Sheen: Degree of luster as measured with specular gloss meter in accordance with ASTM D523:

Flat:	85 degree meter	Below 15
Eggshell:	60 degree meter	5 to 20
Satin:	60 degree meter	15 to 35
Semi-gloss:	60 degree meter	30 to 65
Gloss:	60 degree meter	65 to 80
High Gloss:	60 degree meter	Over 80

G. Industrial Maintenance Primers and Topcoats: High performance coatings formulated for and applied to substrates in industrial, commercial, or institutional situations for purpose resisting heavy abrasion, immersion, prolonged exposure to temperatures in excess of 250 degrees F, prolonged moisture condensation, chemical corrosion, solvent cleaning, or exterior exposure of metal structures.

H. Metallic Pigmented Coatings: Coatings containing at least 0.4 pounds of metallic pigment per gallon of coating as applied.

I. System DFT: Dry film thickness of entire coating system unless otherwise noted.

1.3 SYSTEM REQUIREMENTS

A. Perform testing according to following methods:
1. Solids Content by Volume: ASTM D2832.
2. Surface Burning Characteristics: ASTM E84.

B. Volatile Organic Compound Content: SCAQMD definitions and limitations.

C. Application Requirements: Apply scheduled coatings to exposed surfaces of items and spaces unless specifically indicated otherwise.

D. Surfaces Not To Be Painted:
1. Architectural concrete.
2. Clay and glass unit masonry, decorative concrete unit masonry, and stone.
3. Aluminum and aluminum based alloys, copper and copper based alloys, lead and lead based alloys, nickel and nickel based alloys, stainless steel, plated architectural metals, and "weathering" metals.
4. Decorative plastic and metal laminates, and synthetic countertops.
5. Elastomeric membranes and flashings, roofing materials, and exterior sealants and calking.
6. Acoustic materials.
7. Rubber, vinyl, or plastic seals and bumpers.
8. Surfaces concealed or inaccessible in finished construction unless specifically required.
9. Other surfaces specifically scheduled or indicated to remain unfinished or unpainted.

E. Materials and Products Not To Be Painted:
1. Items with integral or factory-applied final finish unless indicated otherwise.
2. Wire fencing and areaway grating.
3. Cast metal stair nosings, tree grates, trench drain grates, manhole covers, and curb inlets.
4. Wire mesh partitions and gates, metal and wire storage shelving.
5. Moving parts of operating equipment such as valve and damper operators, linkages, sensing devices, motor and fan shafts.

6. UL, FM or other code-required labels, name plates, identification or performance rating labels.
7. Sprinkler heads.
8. Mechanical and electrical items within unfinished spaces unless noted otherwise.

F. Products Requiring Field Applied Final Finish:
1. Coiling overhead doors.
2. Fire hose, valve, and extinguisher cabinets.
3. Sight exposed surfaces of exterior rooftop mechanical and electrical equipment.
4. Convector and finned tube covers.
5. Air outlets and inlets.
6. Electric panelboards.

G. Interface with Adjacent Systems:
1. Review other Sections specifying prime coats to ensure compatibility of total coating system for various substrates.
2. Upon request from other trades, furnish information on characteristics of finish materials proposed for use to ensure compatibility of various coatings.
3. Test compatibility of existing coatings, including shop applied primers and previously applied coatings, by applying specified special coating to small, inconspicuous area.
4. If specified coating lifts or blisters existing coating, apply barrier or tie coat as recommended by coating manufacturer.
5. If no compatible barrier or tie coat exists, remove existing coating completely and apply coating system as specified for new work.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
1. Submit product data, including label analysis for each product proposed for use.
2. Specifically include percent solids-by-volume , volatile organic compound (VOC) content (g/L), and lead content (percent of weight of dried film).
3. Color Charts: Submit manufacturer's standard color chips and charts for use in preparation of Color Schedule.
4. Schedule:
   a. List each material proposed for use, and cross-reference to specific coating system and substrate application.
   b. Identify each material by manufacturer's catalog number, product name, and generic classification.
   c. Include typewritten list identifying coating systems and colors applied to each room, space, or item.

C. Color and Sheen Samples:
1. Prepare 3 samples of each opaque finish coating specified in each color and sheen scheduled for appearance verification.
2. Apply to 12 by 12 by 1/4 inch hardboard. Apply sufficient coating thickness to provide proper hiding and appearance.
3. Label each sample to indicate material, color, and sheen.

D. Coating System Samples:
1. Prepare 3 samples of each transparent coating system scheduled on actual wood substrate proposed for use. Apply in each top coat color scheduled selected.
2. Prepare 3 samples of each opaque coating system scheduled on actual substrate materials proposed for use. Apply in most common top coat color scheduled each top coat colors selected.
3. Step back each coat and process at least one inch to show bare substrate and each coat and process in system build-up.
4. Minimum sample size of 4 by 8 inches.
5. Label each sample to indicate materials, color, sheen, DFT of each coat applied, and total system DFT.

E. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Applicator's qualification data.
   3. Manufacturer's instructions.

F. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Warranty: Submit specified warranty.

G. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Paint
   2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Paint
   3. LEED Credit EQc4.2: Provide paint VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
      a. Interior Latex/Acrylic Based Paint

1.5 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Provide products of single manufacturer for use in each coating system.
   2. Do not mix products of different manufacturers without approval of Architect and manufacturers involved.
   3. Provide manufacturer recommended materials (base and tints) for deep tone colors.

B. Applicator Qualifications: Company specializing in commercial painting and finishing with 3 [5] years documented experience.

C. Regulatory Requirements:
   1. Comply with CPSC 16 CFR 1303 and other applicable federal, state, and local regulations limiting lead content of coatings to be applied.
   2. Comply with applicable State of California regulations limiting volatile organic compound (VOC) content of coatings to be applied. Conduct and report measurement of volatile organic compounds in coatings in accordance with EPA TM-24 or Architect approved method.

D. Certifications: Submit certification from manufacturer [acceptable independent testing laboratory] that materials furnished for use on this Project meet or exceed specified requirements and comply with applicable federal, state, and local requirements regarding lead [and VOC] content.

1.6 FIELD SAMPLES

A. General: Comply with requirements of Section 014500.

B. Sample Installation: Duplicate finishes of approved coating system samples on wall surfaces and other interior and exterior components selected by Architect.

C. Provide full-coat finish on at least 100 sq ft of surface until required color, sheen, and texture are obtained. Simulate finished lighting conditions for review of in-place work.

D. Request review by Architect of first finished room, space, or item for each coating system for color, texture, quality, and workmanship.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Deliver products to site in manufacturer's sealed and labeled containers; inspect to verify compliance with specified requirements.

C. Label containers to indicate manufacturer's name, product name and type of coating, brand code or stock number, date of manufacture, coverage, surface preparation, drying time, cleanup, color designation and instructions for mixing and reducing.

D. Store coating materials in tightly covered containers in well ventilated area at ambient temperatures of 45 degrees F minimum and 90 degrees F maximum, unless required otherwise by manufacturer. Maintain containers in clean condition, free of foreign materials and residue with labels in legible condition.

E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Comply with more restrictive of following or manufacturer's requirements under which systems can be applied.
   1. Provide continuous ventilation during application of coatings to exhaust hazardous fumes.
   2. Provide heating necessary to maintain surface and ambient temperatures within specified limits.
   3. Maintain temperature and humidity conditions for minimum 24 hours before, during, and 48 hours after application of finishes, unless longer times are required by manufacturer.
   4. Do not permit wide variations in ambient temperatures which might result in condensation on freshly coated surfaces.
   5. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
   6. Apply water reducible coatings only when ambient and surface temperatures are between 50 degrees F and 90 degrees F.
   7. Apply solvent reducible coatings only when ambient and surface temperatures are between 45 degrees F and 90 degrees F.
   8. Do not apply coatings under any of following conditions:
      a. When surfaces are damp or wet.
      b. During snow, rain, fog, or mist.
      c. When relative humidity is less than 20 percent or exceeds 85 percent.
      d. When temperature is less than 5 degrees F above dew point.
      e. When dust may be generated before coatings have dried.
      f. In direct sunlight.
      g. When wind velocity is above 20 mph.
   9. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

1.9 WARRANTY

A. Comply with provisions of Section 017800.

B. Warrant installation to be free from defects in material and workmanship for 5 years.

C. Repair or replace defects occurring during warranty period.

D. Defects include but are not limited to pinholes, crazing or cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

1.10 EXTRA STOCK MATERIAL

A. Furnish under provisions of Section 017800.

B. Provide 1 unopened gallon container of each type of opaque top coating in each color and sheen used on Project.

C. Store where directed with labels intact.

PART 2 - PRODUCTS

2.1 COATING MATERIALS - GENERAL

A. Coatings:
   1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
   2. Use manufacturer’s appropriate base materials to achieve required colors.

3. Fully grind pigments to maintain soft paste consistency in vehicle.
4. Capable of being dispersed into uniform, homogeneous mixture.
5. Possess good flowing and brushing properties.
6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
7. VOC content of field applied coatings shall comply with local governing authorities.

B. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building, and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

C. Cal-GREEN Requirements for typical paint coatings:
1. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
2. Flats: 50 grams per liter of product minus water
3. Non-flats: 100 grams per liter of product minus water
4. Non-flat High Gloss: 150 grams per liter of product minus water

2.2 FINISH COATINGS SCHEDULE

A. Exterior Coating Systems:
1. Concrete and Masonry Surfaces:
a. Concrete Walls, Portland Cement Plaster:
1) System No. EC-1 (Latex Finish):
Sheen: Refer to Color Schedule.
Prime Coat: Alkali Resistant Primer at 1.5 mils.
Under Coat: Exterior Latex House Paint at 1.5 mils.
Top Coat: Exterior Latex House Paint at 1.5 mils.
System DFT: 3.0 mils.
b. Exterior Concrete Masonry Units:
1) System No. EC-4 (Latex Finish w/ Acrylic Block Filler):
Sheen: Refer to Color Schedule.
Prime Coat: Exterior Block Filler at 10.0 mils.
Under Coat: Exterior Latex House Paint at 1.5 mils.
Top Coat: Exterior Latex House Paint at 1.5 mils.
System DFT: 3.0 mils (excluding primer).
2. Metal Surfaces:
a. Non-Ferrous Metals and Zinc-Coated (Galvanized) Steel.
1) System No. EM-2 (Latex Finish):
Sheen: Refer to Color Schedule.
Prime Coat: Galvanized Primer at 2.0 mils.
Under Coat: Industrial Acrylic at 3.0 mils.
Top Coat: Industrial Acrylic at 3.0 mils.
System DFT: 8.0 mils.
b. Ferrous Metals - Uncoated:
1) System No. EM-4 (Latex Finish):
Sheen: Refer to Color Schedule.
Prime Coat: Alkyd-Emulsion Primer at 2.5 mils.
Under Coat: Industrial Acrylic at 2.5 mils.
Top Coat: Industrial Acrylic at 2.5 mils.
System DFT: 7.5 mils.
3. Gypsum Surfaces:
a. Gypsum Board Soffits:
1) Coating System No. EG-1 (Latex Finish):
Sheen: Refer to Color Schedule.
Prime Coat: Exterior Alkyd Primer at 2.2 mils.
Under Coat: Exterior Latex House Paint at 1.5 mils.
Top Coat: Exterior Latex House Paint at 1.5 mils.
System DFT: 5.2 mils.

4. Wood Surfaces:
   a. Wood:
      1) System No. EW-2 (Opaque Latex Paint Finish):
         Sheen: Refer to Color Schedule.
         Prime Coat: Exterior Alkyd Primer at 2.2 mils.
         Under Coat: Exterior Latex House Paint at 1.5 mils.
         Top Coat: Exterior Latex House Paint at 1.5 mils.
         System DFT: 5.2 mils.

B. Interior Coating Systems:
   1. Concrete and Masonry Surfaces:
      a. Concrete Walls, Portland Cement Plaster:
         1) System No. IC-1 (Flat Latex Finish):
            Sheen: Flat.
            Prime Coat: Latex Primer at 1.0 mils.
            Under Coat: Interior Latex Flat Paint at 1.4 mils.
            Top Coat: Interior Latex Flat Paint at 1.4 mils.
            System DFT: 3.9 mils.
         2) System No. IC-3 (Latex Finish):
            Sheen: Refer to Color Schedule.
            Prime Coat: Latex Primer at 1.0 mils.
            Under Coat: Interior Latex Enamel at 1.5 mils.
            Top Coat: Interior Latex Enamel at 1.5 mils.
            System DFT: 4.1 mils.
      b. Concrete Masonry Units:
         1) System No. IC-5 (Latex Finish w/ Cementitious Block Filler):
            Sheen: Refer to Color Schedule.
            Prime Coat: Cementitious Block Filler at 300 sq ft per 50 lb bag.
            Under Coat: Interior Latex Enamel at 1.5 mils.
            Top Coat: Interior Latex Enamel at 1.5 mils.
            System DFT: 3.0 mils (excluding primer).
         2) System No. IC-6 (Flat Latex Finish):
            Sheen: Flat.
            Prime Coat: Interior Block Filler at 11.0 mils.
            Under Coat: Interior Latex Flat Paint at 1.4 mils.
            Top Coat: Interior Latex Flat Paint at 1.4 mils.
            System DFT: 2.8 mils (excluding primer).
      c. Non-Ferrous Metals and Zinc-Coated (Galvanized) Steel:
         1) System No. IM-2 (Latex Finish):
            Sheen: Refer to Color Schedule.
            Prime Coat: Galvanized Primer at 2.0 mils.
            Under Coat: Interior Latex Enamel at 1.5 mils.
            Top Coat: Interior Latex Enamel at 1.5 mils.
            System DFT: 5.0 mils.
      d. Ferrous Metals - Uncoated:
         1) System No. IM-4 (Latex Finish):
            Sheen: Refer to Color Schedule.
            Prime Coat: Ethyl Silicate Zinc Primer at 3.0 mils.
            Under Coat: Interior Latex Enamel at 1.5 mils.
            Top Coat: Interior Latex Enamel at 1.5 mils.
            System DFT: 6.0 mils.
      e. Ferrous Metals - Previously Coated:
         1) System No. IM-6 (Latex Finish):
            Sheen: Refer to Color Schedule.
            Prime Coat: Touch-up existing with compatible primer.
            Under Coat: Interior Latex Enamel at 1.5 mils.
            Top Coat: Interior Latex Enamel at 1.5 mils.
            System DFT: 3.0 mils (excluding existing and touch-up primer).

2. Gypsum Surfaces:
   a. Gypsum Board Walls and Ceilings:
      1) System No. IG-5 (Zero VOC, Latex/Acrylic Finish):
         Sheen: Refer to Color Schedule.
         Prime Coat: Manufacturers standard Zero VOC Primer at 1.0 mils.
         Under Coat: Zero-VOC interior latex/acrylic based paint at 1.4 mils.
         Top Coat: Zero-VOC interior latex/acrylic based paint at 1.4 mils.
         System DFT: 3.8 mils)].
3. Wood Surfaces:
   a. Wood:
      1) System No. IW-2 (Opaque Latex Flat Paint Finish):
         Sheen: Flat.
         Prime Coat: Alkyd Enamel Undercoater at 2.0 mils.
         Under Coat: Interior Latex Flat Paint at 1.4 mils.
         Top Coat: Interior Latex Flat Paint at 1.4 mils.
         System DFT: 4.8 mils.
      2) System No. IW-4 (Opaque Latex Paint Finish):
         Sheen: Refer to Color Schedule.
         Prime Coat: Alkyd Enamel Undercoater at 2.0 mils.
         Under Coat: Interior Latex Enamel at 1.5 mils.
         Top Coat: Interior Latex Enamel at 1.5 mils.
         System DFT: 5.0 mils.

2.3 FILLERS AND SEALERS

A. Exterior Block Filler:
   1. Benjamin Moore: Latex Block Filler (m88)
   2. Dunn-Edwards: Concrete Block Filler Smooth (SBPR00 Blockfill)).
   3. PPG: Speedhide Interior/Exterior Latex Block Filler 6-7
   4. Sherwin-Williams: Interior/Exterior Block Filler (B25W25).
   5. Vista: Block Filler (040)

B. Interior Block Filler:
   1. Benjamin Moore and Company: Latex Block Filler (160).
   2. Dunn-Edwards: Concrete Block Filler Smooth (SBPR00 Blocfill).
   3. PPG: Speedhide Interior/Exterior Latex Block Filler 6-7
   4. Sherwin-Williams: Block Filler (B25W25).
   5. Vista: Block Filler (040)

C. Paste Wood Filler:
   1. Benjamin Moore and Company: Benwood (23805)
   2. Dunn-Edwards: Jasco Paste Wood Filler (PWF2703).
   3. Sherwin-Williams: Sherwood Wood Filler.
   4. Vista: Jasco Paste Wood Filler (PWF 2703)

2.4 PRIME COATINGS

A. Exterior Cal-GREEN Compliant Alkali Resistant Primer:
   1. Benjamin Moore: Regal Select Primer (546)
   2. Dunn-Edwards: Eff-Stop Primer(ESPR00)
   3. PPG: Perma-Crete Alkali-Resistant Primer 4-603
   4. Sherwin-Williams: Loxon Masonry Primer (A24W8300)
   5. Vista: Uniprime II Acrylic Masonry Primer (4600)

B. Alkyd Emulsion Primer:
   1. Benjamin Moore: Advance Primer (790)
   2. Dunn-Edwards: Block Rust (BRPR00-1)
   3. PPG: Pitt Tech Plus DTM Acrylic Primer 90-912
   4. Sherwin-Williams: Pro Industrial Pro-Cryl Universal Acrylic Primer, (B66W310).
   5. Vista: Protec Alkyd Emulsion Primer (9600)

C. Ethyl Silicate Zinc Primer:
   1. Benjamon Moore: NA
   2. Dunn-Edwards: Carboline Carbozinc (11 WB).
   3. PPG: Dimetcote 9HS Inorganic Zinc Silicate Primer
   4. Sherwin-Williams: Zinc Clad XI Waterbased Inorganic Zinc Silicate, B69V00011
   5. Vista: Carboline Carbozinc (11WB)

D. Galvanized Primer:
   1. Benjamin Moore: Acrylic Metal Primer (M04)
   2. Dunn-Edwards: Galv-Alum Premium (GAPR00)
   3. PPG: Pitt Tech Plus DTM Acrylic Primer 90-912
   4. Sherwin-Williams: Pro Industrial Pro-Cryl Universal Acrylic Primer (B66-310).
   5. Vista: Protec Primer (No. 9600).

E. Low VOC Latex Primer:
   1. Benjamin Moore and Company: Natura Primer (511).
   2. Dunn-Edwards: ENSO Zero VOC Interior Primer (ENSO 00).
   3. PPG: Speedhide zero Interior Latex Primer 6-4900XI
   4. Sherwin-Williams: ProMar 200 Zero VOC Primer (B28-2600 Series)
   5. Vista: V-Pro Zero VOC Primer (5001)

F. Universal Metal Primer:
   1. Benjamin Moore: Acrylic Metal Primer (M04)
   2. Dunn-Edwards: Ultra Grip Premium ((UGPR00)
   3. PPG: Pitt Tech Plus DTM Acrylic Primer 90-912
   4. Sherwin-Williams: Pro-Industrial Pro-Cryl Universal Acrylic Primer (B66-310).
   5. Vista: Protec Primer (No. 9600).

2.5 WATER REDUCIBLE COATINGS

A. Exterior Premium Acrylic Latex House Paint:
   1. Benjamin Moore and Company:
      a. Flat: Regal Select Flat (400)
      b. Satin: Regal Select Low Luster (401)
      c. Semi-Gloss: Regal Select Soft Gloss (402)
      d. Gloss: NA
   2. Dunn-Edwards:
      a. Flat: Evershield Flat (EVSH10)
      b. Satin: Evershield Low Sheen (EVSH40-0).
      c. Semi-Gloss: Evershield Semi Gloss (EVSH50)
      d. Gloss: Evershield Gloss (EVSH60-0).
   3. PPG
      a. Flat: Speedhide 6-650XI Flat
      b. Satin: Speedhide Satin 6-2045XI
      c. Semi-Gloss: Speedhide Semi-Gloss 6-900XI
      d. Gloss: NA
   4. Sherwin-Williams:
      a. Flat: Duration Flat (K32).
      b. Satin: Duration (K33).
      c. Semi-Gloss: Metalatex SG (B42)
      d. Gloss: Duration (K34)
   5. Vista:
      a. Flat: Duratone (2000)
      b. Eggshell: Carefree 100% Acrylic Eggshell (8300)
      c. Semi-Gloss: Carefree 100% Acrylic Semi Gloss (8400)
      d. Gloss: Carefree 100% Acrylic Gloss (8500)

B. Industrial 100% Acrylic:
   1. Benjamin Moore:
      a. Semi-Gloss: Regal Select Soft Gloss (402)
      b. Gloss: NA

2. Dunn-Edwards:
   a. Semi-Gloss: Evershield Semi Gloss (EVSH50)
   b. Gloss: Evershield Gloss (EVSH60)
3. PPG
   a. Semi-Gloss: .Pitt Tech Plus DTM Acrylic Semi-Gloss 90-1210
   b. Gloss: Pitt Tech Plus DTM Acrylic DTM Gloss 90-1310
4. Sherwin-Williams:
   a. Semi-Gloss: SOLO 100% Acrylic Int/Ext Semi-Gloss, A76W00051
   b. Gloss: Duration Gloss (K34). SOLO 100% Acrylic Int/Ext Gloss, A77W00051
5. Vista:
   a. Semi-Gloss: Acriglo 100% Acrylic Semi Gloss (7000)
   b. Gloss: Acriglo 100% Acrylic Gloss (7700)

C. Zero-VOC Interior Latex/Acrylic Based Paint:
1. Benjamin Moore and Company:
   a. Flat, Natura Flat (512)
   b. Eggshell, Natura Eggshell (513)
   c. Semi-Gloss, Natura Semi-Gloss (514)
2. Dunn-Edwards:
   a. Flat: Enso Flat (ENSO 10)
   b. Eggshell: Enso Eggshell (ENSO 40)
   c. Semi-Gloss: Enso Semi Gloss (ENSO 50).
3. PPG:
   a. Flat: Speedhide zero Interior Flat 6-4110XI
   b. Eggshell: Speedhide zero Interior Eggshell 6-4310XI
   c. Semi-Gloss: . Speedhide zero Interior Semi-Gloss 6-4510XII
4. Sherwin-Williams:
   a. Flat: Harmony Flat (B5).
   b. Eggshell: Harmony Eggshell (B9)
   c. Semi-Gloss: Harmony Semi-Gloss (B10).
5. Vista;
   a. Flat: Carefree Earth Coat Zero VOC Flat (6100)
   b. Eggshell: Carefree Earth Coat Zero VOC Eggshell (6300)
   c. Semi-Gloss: Carefree Earth Coat Zero VOC Semi-Gloss (6400)

2.6 ACCESSORY MATERIALS

A. Muriatic acid, mildewcide, TSP (tri-sodium phosphate), acidic-detergent, zinc sulfate, sodium metasilicate, and solvent: Commercially available, non-damaging to surface being cleaned; as specified in PDCA Specification Manual; acceptable to coating manufacturer.

B. Metal Conditioner: Proprietary phosphoric acid based, etching type solution; acceptable to coating manufacturer.

C. Rust Inhibitor: Water containing 0.32 percent of sodium nitrite and 1.28 percent by weight of secondary ammonium phosphate (dibasic); or water containing 0.2 percent by weight of chromic acid or sodium chromate or sodium dichromate or potassium dichromate.

D. Spackling compound, putty, plastic wood filler, liquid de-glosser, latex patching plaster, latex base filler, thinners, and other materials not specifically indicated but required to achieve finishes specified: Pure, of highest commercial quality, compatible with coatings and acceptable to coating manufacturer.

E. Do not use products of different manufacturers in combination.

2.7 MIXING

A. Use factory prepared colors matching approved samples. Site tinting will not be permitted.

B. Thoroughly mix and stir coatings before use to ensure homogeneous dispersion of ingredients. Prior to application, blend multiple containers of same material and color by pouring from one container to another several times to ensure uniform consistency, color, and smoothness.

C. Mix only in clean mixing pails of material recommended by manufacturer to avoid contamination.

D. Remove film which may form on surface of material in containers and strain material before using. Stir frequently during use to maintain pigments in suspension. Do not stir film into material.

E. Apply coatings of consistency recommended by manufacturer. Thin only within recommended limits using thinners approved by coating manufacturer.

2.8 COLORS AND FINISHES

A. Colors: Refer to Materials Legend.

B. Sheen:
1. Ceilings: Semi-gloss in patient areas; Flat elsewhere unless noted otherwise.
2. Walls: Semi-gloss in areas of high humidity such as locker rooms and bathrooms; Satin/Eggshell elsewhere unless noted otherwise.
3. Metal Doors and Frames: Semi-gloss, unless noted otherwise.
4. Metals with accent colors – Semi-gloss, unless noted otherwise.
5. Painted Wood: Semi-gloss, unless noted otherwise.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Measure moisture content of substrates using recently calibrated electronic moisture meter. Do not apply coatings if moisture content of surfaces exceeds lesser of percentages listed below or those required by coating manufacturer. If excess moisture content exists and cannot be reduced, obtain written approval of coating manufacturer before application of coatings.
1. Gypsum board and gypsum plaster: 17 percent.
2. Architectural woodwork, trim, cabinets, and casework: 10 percent; measure with resistance-type meter in accordance with ASTM D4442.
3. Common board and dimension lumber: 12 percent; measure with resistance-type meter in accordance with ASTM D4442.
4. Masonry, concrete, CMU, and Portland cement plaster: 17 percent for solvent reduced coatings. Test concrete floors in accordance with ASTM D4263.
5. Canvas and cotton insulation coverings: 12 percent max.

C. Prior to applying alkali and acid sensitive coatings, test surface pH with universal pH paper placed against wetted surface. Substrate pH shall not exceed pH of clean wash water.

D. Beginning of execution constitutes acceptance of existing conditions.

3.2 PREPARATION - GENERAL

A. Protect completed construction from damage. Furnish drop cloths, shields, and protective methods to prevent spray, splatter, or droppings from disfiguring other surfaces.

B. Remove surface hardware, mechanical diffusers, escutcheons, registers, electrical plates, light fixture trim, fittings, fastenings and similar items prior to preparing surfaces for finishing. Provide surface-applied protective masking for non-removable items. Carefully store removed items for reinstallation.

C. Remove mildew by scrubbing with mildewcide. Rinse thoroughly with clean water.

D. Before beginning application of coatings, ensure surfaces are clean, dry, and free of dirt, dust, rust or rust scale, oil, grease, mold, mildew, algae, efflorescence, release agents, or any other foreign material which could adversely affect coating adhesion or finished appearance.

3.3 SURFACE PREPARATION FOR NEW WORK

A. General:
1. Correct minor defects.
2. Remove temporary labels, wrappings, and protective coverings from surfaces to be coated.
3. Seal stains, marks, and other imperfections which may bleed through surface finishes.

B. Aluminum:
1. Clean in accordance with SSPC SP1 "Solvent Cleaning".

2. Roughen surface with non-metallic abrasive grit or stainless steel wool, and immediately apply prime paint.

C. Concrete:
1. Prior to application of coatings, allow surfaces to cure minimum 60 days.
2. Remove dirt, scale, powder, laitance, and bond breakers by light sandblasting to minimum 1.5 mil profile.
3. Remove oil and grease with solution of TSP; rinse well.
4. Remove stains caused by weathering or corroding metals with solution of sodium metasilicate applied after thoroughly wetting surface with potable water; allow to dry.
5. Fill cracks and voids with compatible filler.

D. Gypsum Board:
1. Refer to Section 092900 for general surface preparation.
2. Fill remaining cracks, depressions, holes and other irregularities with spackling compound.
3. Sand rough or high spots left by joint cement or spackling compound without damaging paper face.
4. Remove dust by wiping with damp cloths or vacuuming.

E. Masonry:
1. Prior to application of coatings, allow surfaces to cure minimum 28 days.
2. Remove dirt, scale, loose mortar, efflorescence, and powder by wire brushing or by other approved methods.
3. Remove oil and grease with solution of TSP, rinse, and allow to dry.
4. Remove stains caused by weathering or corroding metals with solution of sodium metasilicate applied after thoroughly wetting surface with potable water; allow to dry.
5. Wash and neutralize surfaces as recommended by coating manufacturer, rinse, and allow to dry.

F. Steel - Uncoated:
1. Remove weld spatter by chipping or grinding.
2. Clean interior and weather protected steel in accordance with SSPC SP2 "Hand Tool Cleaning" and SP3 "Power Tool Cleaning". Clean areas of excessive corrosion or scale in accordance with SSPC SP7 "Brush-Off Blast Cleaning".
3. Clean exterior steel permanently exposed to elements in accordance with SSPC SP6 "Commercial Blast Cleaning".
4. Apply metal conditioner to bare surfaces in accordance with manufacturer's recommendations, paying particular attention to abrasions, welds, bolts, and nuts. Allow to set as recommended by solution manufacturer. Rinse with clean water with rust inhibitor mixed with water or applied immediately following rinse. Allow to dry.
5. Prime coat immediately.

G. Steel - Prime Coated:
1. Remove loose primer and rust to feather-edge at adjacent sound primer by cleaning in accordance with SSPC SP2 "Hand Tool Cleaning" and SP3 "Power Tool Cleaning".
2. Apply metal conditioner to abrasions, welds, bolts, and nuts in accordance with manufacturer's recommendations. Allow to set as recommended by manufacturer. Rinse with clean water with rust inhibitor mixed with water or applied immediately following rinse. Allow to dry.
3. Prime coat bare areas immediately.

H. Galvanized Steel: Remove soluble and insoluble contaminants and corrosion. Sweep (Abrasive) Blasting per ASTM D6386 to achieve a uniform anchor profile 1.0 - 2.0 mils.

3.4 SURFACE PREPARATION OF PREVIOUSLY COATED SURFACES

A. General:
1. Remove cracked and deteriorated sealants and calking.
2. Remove chalk deposits and loose, blistered, peeling, scaling, or crazed finish to bare base material or sound substrate by scraping and sanding.
3. Wash surfaces with solution of TSP to remove wax, oil, grease, and other foreign material; rinse, and allow to dry. Exercise caution that TSP solution does not soften existing coating.

4. Abrade glossy surfaces by sanding or wiping with liquid de-glosser.
5. Remove mildew as specified above.
6. Test compatibility of existing coatings by applying new coating to small, inconspicuous area. If new coatings lift or blister existing coatings, request recommendation from Architect.
7. Apply specified primer to surfaces scheduled to receive coatings.

B. Concrete, Masonry, and Portland Cement Plaster:
1. Fill cracks and voids with latex base filler.
2. Apply masonry conditioner to masonry surfaces in accordance with manufacturer's instructions.
3. Apply primer over bare surfaces and filler material.

C. Gypsum Wallboard and Gypsum Plaster:
1. Fill cracks and voids with spackling compound.
2. Apply primer over bare surfaces and newly applied texture coatings.

D. Metal:
1. Remove rust from surfaces to bare metal in accordance with SSPC SP6 "Commercial Blast Cleaning".
2. Exercise care not to remove galvanizing.
3. Complete preparation as specified for new work.

E. Wood:
1. Fill cracks, crevices and nail holes with putty or wood filler.
2. Apply primer over bare surfaces and filler material.

3.5 APPLICATION

A. General Requirements:
1. Coat all surfaces specified, scheduled, illustrated, and otherwise exposed unless specifically noted otherwise.
2. Apply coatings of type, color, and sheen as scheduled.
3. Apply products in accordance with Section 017300. Use application materials, equipment, and techniques as recommended by coating manufacturer and best suited for substrate and type of material being applied.
4. Do not apply finishes to surfaces that are improperly prepared.
5. Number of coats specified are minimum number acceptable.
6. Apply coating systems to total dry film thickness scheduled. Apply material at not less than manufacturer's recommended spreading rate. Do not exceed maximum single coat thickness recommended by coating manufacturer. Do not double-back with spray equipment building up film thickness of two coats in one pass.
7. Ensure that edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent of flat surfaces.
8. Finish edges of coatings adjoining other materials or colors sharp and clean, without overlapping.

B. Prime Coats:
1. Apply initial coat to surfaces as soon as practical after preparation and before subsequent surface deterioration.
2. Backprime exterior woodwork with specified primer.
3. Backprime interior woodwork scheduled to receive transparent finish with gloss varnish reduced 25 percent with mineral spirits.
4. Apply primer to wood and metal sash before field glazing.

C. Intermediate and Top Coats:
1. Allow previously applied coat to dry before next coat is applied.
2. Sand and dust lightly between coats as recommended by coating manufacturer.
3. Apply each coat to achieve uniform finish, color, appearance, and coverage free of brush and roller marks, runs, misses, visible laps or shadows, hazing, bubbles, pin holes, or other defects.
4. If stains, undercoats, or other conditions show through final topcoat, correct defects and apply additional topcoats until coating film is of uniform finish, color, and appearance.

D. Finish Matching:
   1. Finish closets same as adjoining rooms, unless otherwise specified.
   2. Finish tops, bottoms, and edges of doors same as door faces. Apply sanding sealer to cut-outs. When faces are different colors, finish edges of doors to match space from which they are visible when door is in partly open position.
   3. Finish other surfaces not specifically mentioned to match adjoining surfaces.

E. Mechanical and Electrical Items:
   1. Refer to Division 21 – Fire Suppression, Division 22 – Plumbing, Division 23 - Heating, Ventilating, and Air Conditioning, and Division 26 - Electrical for schedule of color coding and identification banding of equipment, ductwork, piping, and conduit. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated.
   2. Prior to finishing mechanical and electrical items, remove louvers, grilles, covers, and access panels and finish separately. Replace when dry.
   3. Paint interior surfaces of ducts, and heating cabinets that are visible or reflective behind grilles and registers with one coat of flat black paint.
   4. Finish dampers visible behind grilles and registers to match surface finish.
   5. Paint both sides and edges of plywood equipment backboards before installing equipment.
   6. Do not apply coatings over name plates, tags, or other equipment identification.

F. Reinstall trim, fittings, and other items removed for finishing.

3.6 FIELD QUALITY CONTROL

A. General: Comply with requirements of Section 014500.

B. Periodically test film thickness of each coat with wet film gage to ensure coatings are being applied to proper thickness.

C. Request review of each applied coat by Architect before application of successive coats. Only reviewed coats will be considered in determining number of coats applied.

D. Immediately prior to Substantial Completion, perform detailed inspection of painted surfaces and repair or refinish abraded, stained, or otherwise disfigured surfaces.

E. Testing: Owner reserves right to employ independent testing agency to verify acceptability of substrates and conformance of coating materials to specified requirements; and to test coating quality and dry film thickness.

F. If test results show that material does not comply with specified requirements, remove noncomplying coatings, recoat with acceptable material, and pay costs of additional testing to ensure compliance.

3.7 CLEANING

A. Promptly remove spilled, splashed, or spattered coatings. Clean spots, oil, and other soiling from finished surfaces using cleaning agents and methods which will not damage materials.

B. If completed construction is damaged beyond normal cleaning or repair by painting operations, replace damaged items at no additional cost to Owner.

C. Maintain premises and storage areas free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

D. Collect waste, cloths, and material which may constitute fire hazards and place in closed metal containers; remove from site daily along with empty containers.

3.8 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect work of other trades against damage from coating activities. Correct damage by cleaning, repairing, replacing, and recoating as acceptable to Architect.

C. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.

END OF SECTION

SECTION 099600

HIGH PERFORMANCE COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior Coatings for:
      a. Site gates.
   2. Exterior Coatings for:
      a. Exposed ferrous metal surfaces.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
   2. Paints and Coatings must meet or exceed the VOC and chemical component limits of Green Seal requirements.
   3. Select locally or regionally fabricated products (within 500 miles of jobsite) wherever possible.
   4. Use coatings that comply with the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1.2 DEFINITIONS

A. DFT: Dry film thickness.

B. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.
   1. Exposed Surfaces: Surfaces of products, assemblies, and components visible after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.
   2. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or entire product or assembly.
   3. Inaccessible Spaces: Spaces not intended for human use.
   4. Spaces listed below are defined as "Concealed" and "Inaccessible":
      a. Space between suspended ceilings and floor and roof construction above.
      b. Inside furred spaces.
      c. Inside of partitions.
      d. Mechanical and electrical items enclosed within casework and equipment.
      e. Foundation spaces.
      f. Crawl spaces.
      g. Trenches and manholes.
      h. Mechanical shafts or chases.
      i. Enclosed elevator shafts [unless visible through glass panels].
      j. Utility tunnels.

C. Sheen: Degree of luster as measured with specular gloss meter in accordance with ASTM D523:

1.	Flat:	85 degree meter	Below 15
2.	Eggshell:	60 degree meter	5 to 20
3.	Satin:	60 degree meter	15 to 35
4.	Semi-gloss:	60 degree meter	30 to 65
5.	Gloss:	60 degree meter	65 to 80
6.	High Gloss:	60 degree meter	Over 80

1.3 SYSTEM REQUIREMENTS

A. Testing Requirements: Test according to following methods.
   1. Abrasion: ASTM D4060.
   2. Adhesion: ASTM D3359, D4541.

3. Humidity: ASTM D4585.
4. Salt Spray (Fog): ASTM B117.
5. Solids Content by Volume: ASTM D2832.
6. Surface Burning Characteristics: ASTM E84.

B. Application Requirements: Apply scheduled coatings to exposed surfaces of items scheduled and otherwise indicated unless specifically noted otherwise.

C. Interface with Adjacent Systems:
1. Review other Sections specifying prime coats to ensure compatibility of total coating system for various substrates.
2. Upon request from other trades, furnish information on characteristics of finish materials proposed for use to ensure compatibility of various coatings.
3. Test compatibility of existing coatings, including shop applied primers and previously applied coatings, by applying specified coating to small, inconspicuous area.
4. If coating lifts or blisters existing coating, apply barrier or tie coat as instructed by coating manufacturer.
5. If no compatible barrier or tie coat exists, remove existing coating completely and apply coating system as specified for new work.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
1. Submit product data including label analysis for each product proposed for use.
2. Specifically include percent solids-by-volume, volatile organic compound (VOC) content lb/gal, and lead content (percent of weight of dried film).
3. Color Charts: Submit manufacturer's standard color chips and charts.
4. Schedule:
a. List each material proposed for use. Cross-reference to specific coating system and substrate application.
b. Identify each material by manufacturer's catalog number, product name, and generic classification.

C. Coating System Samples:
1. Prepare 3 samples of each coating system scheduled on actual substrate materials proposed for use.
2. Provide sample for each top coat color scheduled [selected].
3. Step back each coat at least one inch to show bare substrate and each coat in system build-up.
4. Minimum sample size of 4 by 8 inches.
5. Label each sample to indicate materials, color, sheen, DFT of each coat applied, and total system DFT.

D. Submit following Informational Submittals:
1. Test Reports: Indicate compliance with specified performance requirements.
2. Certifications specified in Quality Assurance article.
3. Qualification Data: Manufacturer's and applicator's qualification data.
4. Manufacturer's Instructions: Include mixing, thinning, and curing requirements; application temperature ranges; and required surface preparation.

E. Closeout Submittals:
1. Submit under provisions of Section 017800.
2. Warranty: Submit specified warranty.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
a. Coatings

2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
   a. Coatings
3. LEED Credit EQc4.2: Provide paint VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
   a. Coatings

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Provide products of single manufacturer for use in each coating system. Do not mix products of different manufacturers without approval of Architect and manufacturers involved.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum 5 years documented experience.

C. Applicator Qualifications: Company specializing in application of coatings scheduled with 3 [5] years documented experience; licensed or approved by coating manufacturer.

D. Regulatory Requirements:
   1. Comply with CPSC 16 CFR 1303 and other applicable federal, state, and local regulations limiting lead content of coatings to be applied.

E. Certifications:
   1. Submit certification from manufacturer that materials furnished for use on this Project meet or exceed specified requirements and comply with applicable federal, state, and local requirements regarding lead and VOC content.

1.6 FIELD SAMPLES

A. General: Comply with requirements of Section 014500.

B. Sample Installation: Duplicate finishes of approved coating system samples on surfaces selected by Architect.

C. Provide full-coat finish on at least 10 linear feet of surface until required color, sheen, and texture are obtained. Simulate finished lighting conditions for review of in-place work.

D. Request review by Architect of first finished room, space, or item for each coating system for color, texture, quality, and workmanship.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Deliver products to site in manufacturer's sealed and labeled containers; inspect to verify compliance with specified requirements.

C. Label containers to indicate manufacturer's name, product name and type of coating, brand code or stock number, date of manufacture, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

D. Store coating materials in tightly covered containers in well ventilated area at ambient temperatures of 45 degrees F minimum and 90 degrees F maximum, unless required otherwise by manufacturer. Maintain containers in clean condition, free of harmful materials and residue with labels in legible condition.

E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Comply with more restrictive conditions under which coatings may be applied; following requirements or manufacturer's requirements.
   1. Provide continuous ventilation during application of coatings to exhaust hazardous fumes.
   2. Provide heating necessary to maintain surface and ambient temperatures within specified limits.

3. Maintain temperature and humidity conditions for minimum 24 hours before, during, and 48 hours after application of finishes.
4. Do not permit wide variations in ambient temperatures which might result in condensation on freshly coated surfaces.
5. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
6. Apply coatings only when ambient and surface temperatures are between 55 degrees F and 90 degrees F.
7. Do not apply coatings under following conditions:
   a. When surfaces are damp and wet.
   b. During snow, rain, fog, and mist.
   c. When relative humidity is less than 20 percent or exceeds 85 percent.
   d. When temperature is less than 5 degrees F above dew point.
   e. When dust may be generated before coatings have dried.
   f. In direct sunlight.
   g. When wind velocity is above 20 mph.
8. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

1.9 WARRANTY

A. Comply with provisions of Section 017800.

B. Warrant against defects in material and workmanship for 5 years.

C. Repair or replace defects occurring during warranty period.

D. Defects include but are not limited to holidays, wrinkling, pinholes, crazing and cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

PART 2 - PRODUCTS

2.1 COATING MATERIALS - GENERAL

A. Coatings:
   1. Furnish coatings with uniform, homogeneous mixture.
   2. Provide cured coating free of streaks and sags, and yielding specified finish.
      a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing 1 or more benzene rings).

B. Coating and Primer Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building. GS-11 VOC limits for interior paints are as follows. Interior refers to all building construction that is inside of the exterior weatherproofing material:
   1. Interior, Non-flats: 150 grams per liter of product minus water
   2. Interior, Flats: 50 grams per liter of product minus water

C. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building, and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

D. Cal-GREEN Requirements for typical high performance coatings:
   1. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
   2. Industrial Maintenance Coatings: 250 grams per liter of product minus water
   3. Non-flats: 100 grams per liter of product minus water
   4. Non-flat High Gloss: 150 grams per liter of product minus water.

2.2 COATINGS SCHEDULE

A. Coatings for Exterior Ferrous (non-galvanized) Metals.
   1. Color and Sheen: Refer to color schedule.

2. Prime Coat: P2 Zinc Rich Primer, DFT 3 mil.
3. Intermediate Coat: P2 Epoxy, DFT 4 mil.
4. Top Coat: U1 Polyurethane, DFT 5 mil.
5. Total DFT: 12 mil.

2.3 PRIMERS AND INTERMEDIATE COATS

A. Type P2 - **Organic** Zinc-Rich Primers:
   1. Acceptable Manufacturers and Products:
      a. Tnemec Company, Inc.: 94H_2O Hydro-Zinc.
      b. Carboline Company, Carbozinc 859 VOC,
      c. ZRC Products Company, Quincy, MA., ZRC Zero-VOC Galvanizing Compound.
   2. Physical Requirements:
      a. Solids content by volume: 63 percent minimum.
      b. Metallic zinc content: 83 percent minimum.
      c. VOC Content (Unthinned): Less than 100 g/L

2.4 EPOXY COATINGS

A. Type E1 - Gloss and Semi-Gloss Catalyzed Epoxy Coatings:
   1. Acceptable Manufacturers and Products:
      a. Tnemec Company, Inc.: Series L69 Tneme-Glaze, Hi-Build Epoxoline II
      b. Carboline Company: Carboguard 893
   2. Physical Requirements:
      a. Solids Content by Volume: 100 percent.
      b. Sheen: Gloss.
      c. VOC Content (Unthinned): 25 g/L Tnemec 280.
   3. Performance Requirements:
      a. General: Tests are based on 2 coats at manufacturer's recommended DFT.
      b. Abrasion: ASTM D4060, CS17 wheel with 1000 g load, maximum 150 mg loss after 1000 cycles.
      c. Adhesion: ASTM D4541, not less than [(750 psi)] pull, average of 5 trials.
      d. Humidity: ASTM D4585, no blistering, cracking, softening, and delamination of film after 1000 hours exposure.
      e. Salt Spray (Fog): ASTM B117, no blistering, cracking, softening, and delamination of film. No more than 1/32 inch rust creepage at scribe after 1000 hours exposure.

2.5 POLYURETHANE COATINGS

A. Type U1 - High Build Polyurethane Coatings:
   1. Acceptable Manufacturers and Products:
      a. Tnemec Company, Inc.: Series 750 UVX
      b. Carboline Company: Carbothane 133 MC.
      c. Dupont: Imron Industrial Strength Ultra Low VOC Polyurethane
   2. Properties:
      a. Sheen: Semi-Gloss
      b. Solids by Volume: 72 +/- 2 percent.
      c. VOC: 99 grams/litre
   3. Performance Criteria:
      a. Abrasion: ASTM D4060, (CS-17 Wheel, 1,000 grams load. No less than 129 mg loss after 1,000 cycles.
      b. Adhesion: ASTM D4541 (Type II). No less than 1,633 psi (11.25 MPa) pull.
      c. Cleanability: MIL-PRF-85285C Section 4.6.13. No less than 84% cleaning efficiency.
      d. Hardness: ASTM D 3363. No gouging or scratching with a HB or less pencil.
      e. Humidity: ASTM D4585. No blistering, cracking, rusting or delamination of film after 2,000 hours exposure.
      f. Salt Spray (Fog): ASTM B117. No blistering, cracking, rusting or delamination of film. No more than 3/16 inch rust creepage at scribe after 2,500 hours exposure.

2.6 ACCESSORY MATERIALS

A. Cleaners:
   1. General: Mildewcide, TSP (tri-sodium phosphate), acidic-detergent, zinc sulfate, sodium metasilicate, and solvents:
   2. Commercially available.
   3. Non-damaging to surface being cleaned
   4. Complying with PDCA Specification Manual.
   5. Acceptable to coating manufacturer.

B. Metal Conditioner: Proprietary phosphoric acid based, etching type solution; acceptable to coating manufacturer.

C. Rust Inhibitor:
   1. Water containing 0.32 percent by weight of sodium nitrite and 1.28 percent by weight of secondary ammonium phosphate (dibasic).
   2. Water containing 0.2 percent by weight of chromic acid, sodium chromate, sodium dichromate, or potassium dichromate.

D. Spackling compound, putty, fillers, liquid de-glosser, patching plaster, thinners, and materials not indicated but required to achieve finishes. Compatible with coating system and acceptable to coating manufacturer.

E. Do not use products of different manufacturers in combination, unless approved by each manufacturer of products involved.

2.7 MIXING

A. Use factory prepared colors matching approved samples. Site tinting will not be permitted.

B. Thoroughly mix and stir coating components before use to ensure homogeneous dispersion of ingredients. Prior to application, blend multiple containers of same material and color by pouring from one container to another several times to ensure uniform consistency, color, and smoothness.

C. Mix in clean pails of material recommended by manufacturer to avoid contamination.

D. Mix only enough of multi-part coatings to allow application within pot life of mixture.

E. Remove film which may form on surface of material in containers and strain material before using. Stir frequently during use to maintain pigments in suspension. Do not stir film into material.

F. Apply coatings of consistency instructed by manufacturer.

G. Thinning:
   1. Provide thinners approved by coating manufacturer.
   2. Add thinners within manufacturer recommended limits.

2.8 COLOR SCHEDULE

A. Refer to color schedule on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Measure moisture content of surfaces using recently calibrated electronic moisture meter. Do not apply coatings if moisture content of surfaces exceeds lesser of percentages listed below or those required by coating manufacturer. If excess moisture content exists and cannot be reduced, obtain written approval of coating manufacturer before application of coatings.
   1. Gypsum board and gypsum plaster: 17 percent.
   2. Masonry, Concrete, CMU, and Portland Cement Plaster: 17 percent for solvent reduced coatings. Test concrete floors in accordance with ASTM D4263.

C. Prior to applying alkali and acid sensitive coatings, test substrate pH. Substrate pH shall not exceed pH tolerance recommended by manufacture.

3.2 PREPARATION

A. Protect completed construction from damage. Furnish drop cloths, shields, and protective methods to prevent spray, splatter or droppings from disfiguring other surfaces.

B. Remove surface hardware, mechanical diffusers, escutcheons, registers, electrical plates, light fixture trim, fittings, fastenings and similar items prior to preparing surfaces for finishing. Provide surface-applied protective masking for non-removable items. Carefully store removed items for reinstallation.

C. Remove mildew by scrubbing with mildewcide. Rinse thoroughly with clean water.

D. Before beginning application of coatings, ensure surfaces are clean, dry, and free of dirt, dust, rust, and rust scale, oil, grease, mold, mildew, algae, efflorescence, release agents and other harmful materials which could adversely affect coating adhesion and finished appearance.

3.3 SURFACE PREPARATION FOR NEW WORK

A. General:
1. Correct minor defects.
2. Remove temporary labels, wrappings, and protective coverings from surfaces to be coated.
3. Seal stains, marks, and other imperfections which may bleed through surface finishes.
4. Clean in accordance with SSPC SP1, "Solvent Cleaning".

B. Steel - Unprimed:
1. Remove weld spatter by chipping or grinding.
2. Clean exterior steel permanently exposed to elements in accordance with SSPC SP6 "Commercial Blast Cleaning".
3. Apply primer, or metal conditioner to bare surfaces in accordance with coating schedule manufacturer's recommendations, paying particular attention to abrasions, welds, bolts, and nuts. Allow to set as recommended by manufacturer.

3.4 APPLICATION

A. General:
1. Coat surfaces specified, scheduled, illustrated, and otherwise identified unless specifically noted otherwise.
2. Apply coatings of type, color, and sheen as scheduled.
3. Apply products in accordance with manufacturer's instructions. Use application materials, equipment, and techniques as instructed by coating manufacturer and best suited for substrate and type of material being applied.
4. Do not apply finishes to surfaces that are improperly prepared.
5. Quantify of coats specified are minimum quantify acceptable.
6. Apply coating systems to achieve scheduled total dry film thickness.
7. Apply material at not less than manufacturer's instructed spreading rate.
8. Do not exceed maximum single coat thickness instructed by coating manufacturer.
9. Do not double-back with spray equipment building up film thickness of two coats in one pass.
10. Ensure that edges, corners, crevices, welds, and exposed fasteners, receive dry film thickness equivalent of flat surfaces.
11. Finish edges of coatings adjoining other materials and colors sharp and clean manner, without overlapping.

B. Prime Coats:
1. Apply initial coat to surfaces as soon as practical after preparation and before subsequent surface deterioration.
2. Apply primer to sash before glazing.

C. Intermediate and Top Coats:
1. Allow previously applied coat to dry before next coat is applied.
2. Sand and dust lightly between coats as recommended by coating manufacturer.
3. Apply each coat to achieve uniform finish, color, appearance, and coverage free of brush and roller marks, runs, misses, visible laps and shadows, hazing, bubbles, pin holes, and other defects.

4. If stains, undercoats, and other conditions show through final topcoat, correct defects and apply additional topcoats until coating film is of uniform finish, color, and appearance.

D. Mechanical and Electrical Items:
1. Refer to Division 21, 22, 23 - Fire Protection, Plumbing, and Mechanical and Division 26 - Electrical for schedule of color coding and identification banding of equipment, ductwork, piping, and conduit. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated.
2. Prior to finishing mechanical and electrical items; remove and finish separately louvers, grilles, covers, and access panels. Replace when dry.
3. Do not apply coatings over name plates, tags, and other equipment identification.

E. Replace trim, fittings, and other items removed for finishing.

3.5 FIELD QUALITY CONTROL

A. General: Comply with requirements of Section 014500.

B. Periodically test film thickness of each coat with wet film gage to ensure coatings are being applied to proper thickness.

C. Request review of each applied coat by Architect [and manufacturer's representative] before application of successive coats. Only reviewed coats will be considered in determining number of coats applied.

D. Immediately prior to Substantial Completion, perform detailed inspection of coated surfaces and repair or refinish abraded, stained, and otherwise disfigured surfaces.

E. Testing: Owner reserves right to employ independent testing agency to verify acceptability of substrates and conformance of coating materials to specified requirements; and to test coating quality and dry mil thickness.

F. If test results show that material does not comply with specified requirements, remove noncomplying coatings, recoat with complying material, and pay costs of additional testing to ensure compliance.

3.6 CLEANING

A. Promptly remove spilled, splashed, and spattered coatings. Clean spots, oil, and other soiling from finished surfaces using cleaning agents and methods which will not damage materials.

B. If completed construction is damaged beyond normal cleaning and repair by coating operations, replace damaged items at no additional cost to Owner.

C. Maintain premises and storage areas free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

D. Collect waste, cloths, and material which may constitute fire hazards and place in closed metal containers; remove from site daily along with empty containers.

3.7 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Protect work of other trades against damage from coating activities. Correct damage by cleaning, repairing, replacing, and recoating as acceptable to Architect.

C. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.

END OF SECTION

SECTION 099623

GRAFFITI-RESISTANT COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Graffiti resistant coatings for coatings over exterior plaster at the ground floor in the alley.

1.2 SUBMITTALS

A. Product Data: Submit product data for coatings.

B. Samples: Submit 12 by 24 inch samples on each type of substrate indicated to receive repellent treatment with specified coating applied at required rate to half of each sample.

C. Submit following Informational Submittals:
   1. Qualification Data: Applicator's qualification data.
   2. Manufacturer's instructions.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.

1.4 FIELD SAMPLES

A. Provide 100 square foot sample of coating for Architect's review.

B. Verify that substrate has received sufficient amount of coating to perform as intended and that application has not stained or discolored surface.

C. Sample may be incorporated as part of work if approved in writing by Architect.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store products above 50 degrees F, but no greater than 85 degrees F unless otherwise recommended by manufacturer.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply coating when ambient or substrate surface temperatures are below 40 degrees F or higher than 100 degrees F.

B. Do not apply during inclement weather or when forecasted conditions will not permit work in accordance with manufacturer's printed instructions.

C. Provide mechanical ventilation during and after application to dissipate fumes if natural ventilation is insufficient. When working outside, cover exterior air conditioning vents and turn off air handling equipment to avoid solvent odors within the building.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Graffiti Resistant Coating:
   1. Permanent (non-sacrificial), low viscosity, gloss-free, nearly invisible, non-yellowing, breathable, VOC compliant liquid that impregnates plaster and masonry surfaces to form a stain resistant barrier that allows the easy removal of graffiti from surfaces without staining.
   2. Mixing: Proper proportions as required by manufacturer for Project conditions for horizontal and vertical surfaces.
   3. Coats: Minimum of 2 coats; additional coats may be required on porous surfaces.
   4. Location: Coatings over plaster and painted metals.
   5. Acceptable Products and Manufacturers:
      a. Monochem Permashield Premium Graffiti Control System, Monopole Inc., Los Angeles, CA. (required for use on fiber cement board panels)

b. Graffiti Solution System, American Polymer Corporation, Sandy, UT.
c. Siloseal WB, L&M Construction Chemicals, Omaha, NE.
d. Protectosil Antigraffiti, Degussa Corp., Parsippany, NJ.
e. Dur A Pell GS, Chemprobe Coating Systems, Subsidiary Tnemec, Kansas City, MO.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work when substrates are ready.
B. Verify that surfaces are clean, dry, dust free, and free of efflorescence, oil or other matter detrimental to coating application.
C. Verify that joint sealant work in adjoining surfaces is complete.

3.2 PREPARATION

A. Remove loose particles, foreign matter, and oil by method which will not affect coating application.
B. Allow surfaces to dry sufficiently after washing in accordance with manufacturer's directions.
C. Protect adjacent surfaces from overspray or drift.

3.3 APPLICATION

A. Apply in accordance with manufacturer’s instructions.
B. Apply coating using low pressure airless sprayer or roller in number of coats and at rate indicated by manufacturer to obtain penetration and full coverage.
C. Do not dilute or alter material as packaged.

3.4 PROTECTION AND CLEANING

A. Protect adjacent surfaces, landscaping and property from spillage, overspray, or drift.
B. Clean spillage, overspray, or drift from adjacent surfaces; remove immediately in accordance with manufacturer's instructions.

END OF SECTION

DIVISION 10

SPECIALTIES

SECTION 101400

CODE REQUIRED SIGNS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Code required signage.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for each type of sign specified, including details of construction relative to materials, dimensions, profiles, and finishes.

C. Shop Drawings:
   1. Submit shop drawings covering fabrication, installation and finish of specified systems.
   2. Include following:
      a. Fully dimensioned plans and elevations with detail coordination keys.
      b. Locations of exposed fasteners and joints.
      c. Message list for each sign required, including large-scale details of wording and lettering layout.

D. Samples:
   1. Cast Acrylic Sheet and Plastic Laminate: Panel 8 inch square minimum for each material, color, texture, and pattern required. Include sample of graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: Extrusions of alloy and temper recommended by sign manufacturer for type of use and finish indicated, and with not less than strength and durability properties specified in ASTM B221 for 6063-T5.

B. Vinyl Die-Cut Lettering Film:
   1. Opaque nonreflective vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior and interior applications.
   2. Color as selected by Architect.

C. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to sign material and mounting surface.

D. Colored Coatings for Acrylic Plastic Sheet: Colored coatings, including inks and paints for copy and background colors; recommended by acrylic manufacturers for optimum adherence to acrylic surface, and nonfading for application intended.

2.2 CODE SIGNAGE

A. General: Signage shall conform to CBC Sections as referenced below.

B. Braille: Use Contracted Grade 2 Braille whenever Braille symbols are specifically required. Dots shall be 1/10 inch on center within each cell with 2/10 inch space between cells. Dots shall be raised 1/40 inch above background. Refer to CBC Section 11B-703.5.1.

C. Sign Schedule: Provide signage as required by codes and accessibility regulations and requirements. These include, but are not limited to:
   1. Illuminated Exit Signs: Refer to Division 26.

2. Fire Doors (CBC Section 1008)
3. Room Capacity (CBC Section 1004.3)
4. Elevator Signs (CBC Section 3002.3)
5. Stairway Identification (CBC 1133.B.4, DSA Policy 98-06 1127B.3)
6. Accessibility signs (ADA Accessibility 28 CFR 35 Requirements including Braille) including toilet facilities, doors to exitways. (CBC Sections 1011.3, 11B-703, 11B-216.8, and 11B-210.1).

D. Signage types: Refer to Signage on Drawings for quantity and location of code required signs. Final signage materials, color, font, characteristics, and branding graphics shall be coordinated with Owner provided signage package.

2.3 PANEL SIGNS

A. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions.

B. Graphic Content and Style: Sign copy that complies with requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Examine supporting members to ensure surfaces are at proper elevation and are free from dirt or other deleterious matter.

3.2 INSTALLATION

A. General:
1. Locate sign units and accessories where indicated, using concealed mounting methods in compliance with manufacturer's instructions.
2. Install signs and letters level, plumb, and at height indicated, with sign surfaces free from distortion or other defects in appearance.
3. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using double-sided tape or velcro.
4. Apply self-adhering pressure-sensitive letters in accordance with manufacturer’s directions.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's instructions. Protect units from damage until acceptance by Owner.

END OF SECTION

SECTION 102114

PHENOLIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Floor mounted toilet compartments and urinal screens.

B. Related Sections:
   1. Section 102813 - Toilet Accessories.

C. This project is a registered US Green Building Council LEED project. Submit documentation on following:
   1. Select locally or regionally fabricated products wherever possible.
   2. Verify if a local plant (within 500 miles of jobsite) can supply the product.
   3. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort. Meet or exceed VOC limits for adhesives, paints, composite wood products, and carpet systems.
   4. Manufacture phenolic core material from rapidly renewable resource.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Shop Drawings: Submit shop drawings showing complete layout, swing of doors, elevations, method of assembly and anchorage, and installation details.

C. Material Samples:
   1. Submit samples of actual phenolic chips for approval and color selection. Chips shall be not less than 2 inches x 3 inches and shall be from toilet partition manufacturer's standard range of colors.
   2. Submit samples of hardware and fasteners.

D. Certificates: Furnish manufacturer's certification that materials meet or exceed specification requirements.
   1. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

E. LEED Data: Provide special submittals conforming to Section 018113 – LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Provide project materials cost data for the following materials.
      a. Phenolic Core.
   2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
      a. Toilet Compartments and Accessories.
   3. LEED Credit EQc4.4: Provide low emitting material for specified product type.
      a. Phenolic Core.
   4. LEED Credit MRc6: Provide rapidly renewable material for specified product type.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with Authorities Having Jurisdiction to accommodate barrier free design.

1.4 SEQUENCING AND SCHEDULING

A. Coordinate Work with placement of anchorage devices. Supply rough-in data in sufficient time to provide concealed preparatory work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Accurate Partitions Corp., Lyons, IL.

2. Ampco Products, Inc., Miami, FL.
3. General Partitions Manufacturing Corp., Erie, PA.
4. Global Partitions, Eastanollee, GA.
5. Knickerbocker Partitions Corp., Freeport, NY.
6. Weis/Robart Partitions, Inc., Detroit, MI.

2.2 MATERIALS

A. Solid Phenolic:
1. Solid Phenolic Sheet: Class B rating. One-piece melamine face sheets bonded under heat and high pressure to core of phenolic resin impregnated kraft sheets. Polish exposed edge components black, chamfered and free of milling marks.
2. Fabricate core from rapidly renewable materials to greatest extent possible.
3. Color, pattern, and texture as selected by Architect from full range of manufacturer options.

B. Brackets: Stainless steel with satin finish, aluminum with clear anodized finish, brass with chrome plated finish, or die cast zamac alloy with chrome plated finish.

C. Pilaster Shoes and Sleeves (Caps): ASTM A167 or A666, Type 302 or 304 stainless steel, not less than \0.0313 inch thick and 3 inches high, finished to match hardware.

D. Hardware: Manufacturer's standard design of stainless steel with satin finish, brass with chrome plated finish, anodized aluminum, or die cast zamac alloy with chrome plated finish.
1. Hinges: Surface mounted, heavy-duty, gravity or spring-action cam, adjustable to hold door open at any angle up to 90 degrees. Self-closing at barrier free compartments.
2. Latch: Surface mounted, equipped with accessible slide bolt, combination strike/keeper with rubber bumper, and emergency operation feature mounted at 30-44 inches above floor.
3. Coat Hook/Bumper: Combination unit with hook and rubber tipped bumper at in-swinging doors. Independent units with coat hook on interior and rubber tipped bumper on exterior side of door at outswinging doors mounted at 48 inches above floor.
4. Pull: At accessible stalls, surface mounted U-shaped design on both sides of outswinging doors, mounted at 30-44 inches above floor; directly below latch.

E. Anchorage Devices:
1. Exposed Fasteners: Manufacturer's standard stainless steel or chrome plated brass, theft-resistant type screw head and nuts.
2. Concealed Fasteners: Stainless steel.

F. Head Rail Bracing: Extruded aluminum, anti-grip style with cast socket type wall brackets, clear anodized finish.

2.3 FABRICATION

A. Toilet Compartments: Floor supported-overhead braced design.

B. Urinal Screens: Floor supported design.

C. General Requirements: Take field measurements to ensure proper fitting of Work. Shop assemble to greatest extent possible.
1. Factory cut recesses, clearance holes and cut outs for hardware, fittings, and accessories.
2. Grab bars and toilet paper holders are specified in Section 102813.

D. Pilasters: 1 inch minimum finished thickness.
1. Widths as necessary by compartment sizes and spacing.
2. Equip with leveling devices, anchor studs, and locking nuts.
3. Equip with stainless steel shoe, 3 inch height minimum, satin finish; no exposed fasteners permitted.

E. Compartment Panels: 1/2 inch thick by 58 inch high by dimensions shown, seamless, matte finish, free of milling marks.

F. Stiles: 1 inch thick by dimensions shown, seamless, matte finish, free of milling marks.

G. Compartment Doors: 3/4 inch thick by 58 inch high by dimensions shown, 34 inch minimum width at accessible compartments; manufacturers standard width at other compartments, seamless, matte finish, free of milling marks..

H. Urinal Screens: Same basic construction as components for toilet compartments.
   1. Panel of 18 inch width, 42 inch height, unless indicated otherwise on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.
   1. Check areas scheduled to receive compartments for correct dimensions, plumb of walls, soundness of wall surfaces, location of built-in anchorage/supporting devices, and other conditions that would affect proper installation of holding brackets and anchorage or suspension devices. See Section 055000 for above ceiling anchorage and supporting devices.
   2. Verify spacing of plumbing fixtures to ensure compatibility with compartment installation.
   3. At metal stud assemblies: In addition to anchorage and supporting devices provided as Work of Section 055000, provide continuous wood or metal blocking secured to studs and mechanically anchor units to blocking. Provide specific type of blocking required by unit manufacturer.

3.2 INSTALLATION

A. General: Install in accordance with Section 017300.
   1. Install compartments and urinal screens rigid, straight, plumb, and level in accordance with manufacturer's printed instructions.
   2. Maintain 1/2 inch maximum clearances between pilasters and panels.
   3. Maintain 1 inch maximum clearances between panels and walls.
   4. Secure panels to walls with not less than two stirrup brackets attached near top and bottom of panel.
   5. Attach wall brackets with fastener holes located over tile joints.
   6. Conceal evidence of drilling, cutting, and fitting of room finishes.

B. Floor Supported Overhead Braced Compartments: Secure pilasters to floor with pilaster supports anchored with 2 inch minimum penetration into floor system.
   1. Level, plumb, and tighten installation with leveling device.
   2. Secure pilaster shoes in position.
   3. Secure headrail to pilasters with not less than two fasteners. Secure headrail to walls using brackets.
   4. Set tops of doors parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Install with two brackets in same manner as compartments.

3.3 ADJUSTING AND CLEANING

A. Adjusting: Adjust and lubricate hardware for proper operation after installation.
   1. Set hinges on inward swing doors to hold doors open approximately 30 degrees angle from closed position when unlatched.
   2. Set hinges on outward swing doors to hold doors open approximately 10 degrees from closed position.
   3. Perform final adjustments to leveling devices and hardware.
   4. Adjust and align door hardware for uniform 3/16 inch clearance at vertical edges.

B. Cleaning: Comply with Section 017400. Clean exposed surfaces free of oil, dirt, and imperfections.

END OF SECTION

SECTION 102213

WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 087100 - Door Hardware: Cylinders for locking devices.
   2. Section 099000 - Paints and Coatings.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit descriptive literature and technical data on each component of system and of fabricated assembly.

C. Shop Drawings:
   1. Submit shop drawings for fabrication and erection of wire mesh installation.
   2. Include plans, elevations, and large scale details showing door operations, hardware locations, anchorage, and accessory items.
   3. Provide location template drawings for items which attach to permanent construction.

D. Submit following Informational Submittals: Certifications specified in Quality Assurance article.

E. Manufacturer's Instructions: Submit descriptive literature on installation methods and procedures.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Member of Woven Wire Products Association and specializing in products specified for minimum of three years.

B. Erector Qualifications: Company specializing in wire products installations with two years successful experience in completion of similar sized projects.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Type 400A, AAA Partitions, King Wire Partitions, Inc., Los Angeles, CA.
   2. No. 130A, Acorn Wire and Iron Works, Chicago, IL.
   3. Type 4C, Kentucky Metal Products Company, Louisville, KY.
   4. No. 100M, Miller Wire Works, Inc., Birmingham, AL.
   5. Type 135, Standard Wire and Steel Works, Inc., Harvey, IL.
   6. Sure-Guard, The GS Company, Baltimore, MD.

2.2 MATERIALS

A. Wire Mesh Partitions:
   1. Fabric: 1-1/2 inch diamond mesh, 10 gage crimped steel wire, securely clinched to frame.
   2. Vertical Frames: 1-1/4 by 5/8 inch cold-rolled "C" section channels with 1/4 inch bolt spacing between 12 and 15 inches OC.
   3. Horizontal Frames: 1 by 1/2 by 1/8 inch cold-rolled channels; joints mortised and tensioned.
   4. Center Reinforcing Bar:
      a. 1 by 1/2 by 1/8 inch cold-rolled channel tensioned to side frames with wires passed through center bar.
      b. Provide number of members to suit panel height per manufacturer's recommendation.
   5. Stiffening bars (for free standing partitions over 8’-0" in height): Flat bar posts, size as recommended by partition manufacturer.
   6. Top Capping Bar: 2-1/4 by 1 inch cold-rolled channel with 1/4 inch "U" bolts 28 inch OC.
   7. Corner Posts: 1-1/4 by 1-1/4 by 1/8 inch angles with 1/4 inch bolt holes to match partition.
   8. Floor Sockets: 2-1/2 inch high ductile iron (weldable) with set screw adjustment.

9. Sheet Metal Base: 16 gage formed panels, welded or bolted to frames.
10. Hinged Door:
    a. Frame: 1-1/4 by 1/2 by 1/8 inch channel with 1/4 by 1/8 inch flat bar cover three sides, 1-3/8 by 3/4 by 1/8 inch angle riveted to lock side.
    b. Hinges: Three butt hinges riveted or welded to both door and frame.
11. Hardware: Cylinder type locks on doors; provided in Section 087100.
12. Related Items: Bolts, hardware housing, and accessories required for installation.

2.3 FABRICATION

A. Fabricate panels, doors, and other items to profiles and sizes indicated, with framing members fitted, reinforced, and braced to suit design requirements.

B. Provide reinforced cut-outs for pipes, ducts, beams, and other items shown or as necessary for secure partition installation. Finish edges of cutouts for a neat, protective edge.

C. Grind exposed welds flush and smooth.

D. Make exposed joints flush and hairline.

2.4 FINISHES

A. Electrostatic spray painted enamel, in color as selected by Architect from manufacturer's standard colors.

B. Provide manufacturer's standard primer compatible with finish paint selected in Section 099000 for field painting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify substrates are complete, blocking and anchorage devices are properly placed, and that there are no irregularities present which would interfere with installation.

3.2 PREPARATION

A. Measure and lay out intended locations. Measure parallel to surface of substrate.

B. Locate and mark position of posts. Locate vertical posts at equal distance spacing, not exceeding 5'-0" centers.

C. Begin Work only when substrates have been properly prepared.

3.3 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Erect partitions, plumb, rigid, properly aligned, and securely fastened in place.

C. Provide additional field bracing as shown or necessary for rigid, secure installation.

D. Anchor to floor with flanged universal support bases and compression pins.

E. Attach wire fabric to rails with tension bars bolted to rails with tamper-proof fasteners spaced at 15 inches OC maximum.

F. Install cylinder lock masterkeyed to building as part of Work of Section 087100.

G. Finish paint in accordance with Section 099000, color as selected by Architect.

3.4 ADJUSTING

A. Adjust brace rails and tension rods for rigid installation.

B. Tighten hardware, fasteners, and accessories. Adjust hardware to provide smooth operation of doors.

C. Touch up damaged finish with matching paint.

END OF SECTION

SECTION 102226

OPERABLE PARTITIONS

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Operation: Motorized, top supported from overhead track without use of floor guides.
   2. Panel types: Continuously Hinged Panels.
   3. Stack method: Center.
   4. Seismic Performance: Provide operable partitions capable of withstanding the effects of earthquake motions determined according to applicable code requirements.

B. Performance Requirements:
   1. Surface Burning of Fabric Finish: ASTM E84; flame//smoke rating of 25/50 maximum.
   2. Sound Transmission Loss: ASTM E90 and ASTM E413; minimum STC of 51 tested on 100 square feet opening.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit manufacturer's standard product data describing performance, operation, hardware, and related accessories.

C. Shop Drawings:
   1. Indicate fully dimensioned layout, showing details of conditions at head, jambs, and floor , passage doors, and pocket door requirements.
   2. Indicate dimensions of stacked partitions and total weight of partition.
   3. Indicate materials and components used in fabricating partition and accessories.
   4. Indicate materials and components for suspension system, roller assemblies, tracks, switching, seals, and associated hardware.
   5. Indicate requirements for support construction.

D. Samples: Submit samples of available finish material samples for each type surface specified for Architect's selection.

E. Submit following Informational Submittals:
   1. Test Reports:
      a. Submit independent laboratory sound transmission test report on letterhead of testing laboratory.
      b. Indicate following minimum requirements:
         1) Name of manufacturer submitting test specimen.
         2) Detailed description of specimen tested, including weights.
         3) Date of test.
         4) Testing of laboratory's identification or test number.
         5) Testing procedures employed.
         6) Results of test by listing of frequencies and chart plotted from results.
         7) Signature of independent laboratory's official attesting the report.
   2. Certifications specified in Quality Assurance article.
   3. Qualification Data: Manufacturer's and installer's qualification data.
   4. Manufacturer's instructions.
   5. Manufacturer's field reports.

F. Maintenance Data:
   1. Submit maintenance instructions under provisions of Section 017800.
   2. Describe recommended cleaning materials and methods, including spot removal procedures.
   3. Describe cleaning materials detrimental to finish surface and hardware finish.
   4. Describe maintenance procedures for electric operator and components.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Trained and authorized by manufacturer and having successfully completed similar sized installations with minimum of 5 years documented experience.

B. Certificates: Submit manufacturer's certificates attesting compliance with specified STC ratings.

C. Qualification Data: Submit installer's qualifications verifying years of experience; include list of completed projects having similar scope of Work identified by name, location, date, reference names and phone numbers.

D. Manufacturer's Instructions: Submit descriptive literature indicating installation methods, adjustments, and maintenance procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

1.5 SEQUENCING AND SCHEDULING

A. Do not begin Work until support construction is complete.

B. Coordinate Work with ceiling and support construction.

1.6 WARRANTY

A. Comply with provisions of Section 017800 requirements.

B. Provide manufacturer’s warranty agreeing to repair and/or replace components of operable panel partitions that fail in materials or workmanship during warranty period of 2 years from date of Notice of Final Completion.

C. Failures include, but are not limited to, the following:
   1. Faulty operation of operable panel partitions.
   2. Deterioration of metals, metal finishes, and other materials beyond normal wear.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Manufacturers:
   1. Advanced Equipment Corp. (AEC), Fullerton, CA.
   2. Hufcor, Inc., Janesville, WI.
   3. Modernfold Inc., A DORMA Group Co., Greenfield, IN.

B. PRODUCTS INDICATED BELOW ARE steel faced SERIES. USE NUMBERS BASED ON ACTUAL PRODUCT Acceptable Electrically Operated Continuous Hinged Panel Products: Top supported, manually operated, 3 inch thick; no floor track required.
   1. Type 2EC Alpha Panels, Advanced Equipment.
   2. Series 633E with Hufguard, Hufcor.
   3. Acousti-Seal Model 933E, Modernfold.

C. STC: 51.

2.2 MATERIALS

A. Panels:
   1. Construction: All steel welded construction, skin not less than 24 gage steel, assembled to steel frame not less than, reinforced to receive suspension components, core of appropriate stiffening and sound attenuation materials.
   2. Sizes: Manufacturer's standard widths, nominal 3 to 4 inch thickness.
   3. Trim: Wrap-around skin construction for groove appearance at vertical panel joints; exposed trim not acceptable. Extruded aluminum, clear anodized finish.

B. Sound Seals:
   1. Vertical Seals: Interlocking design with resilient extruded vinyl gaskets between panels.
   2. Top Seals: Fixed continuous contact type extruded vinyl gaskets, multi-finger design.
   3. Bottom Seals: Fully recessed into panel, continuous contact type, for automatic operation; black satin or dark bronze finish for exposed seal channel.

C. Overhead Suspension System:
   1. Track: Manufacturer's formed steel, supported by adjustable steel hanger rods and suspension brackets. Size, thickness and profile designed to support live and dead loads , including track switches of design as required for configurations indicated.
   2. Continuously Hinged Panel Carriers: Type as recommended by manufacturer for application and model selected, with minimum of one suspension point on every other panel.

D. Accessories:
   1. White enamel track.
   2. Jamb molding with integral resilient acoustic seal.
   3. Fittings and attachments.
   4. Automatic top seals; automatic drop seals sweep seals at bottom.
   5. Vertical sound seal gaskets.
   6. Hinged pass thru doors of size, location and configuration indicated.

E. Hardware: Manufacturer's standard pull-in type latching door handles.

F. Electric Operator: UL approved; 12 inches per second traveling speed; voltage, phase, and horsepower as recommended by manufacturer for weight of doors; adjustable friction clutch brake actuated by solenoid controlled motor starter; enclosed magnetic reversing starter.

G. Control Station: Two standard keyed three position (open-stop-close) momentary contact type switch; 24 volt circuit; recess mounted.

H. Conduit and Outlet Boxes: Concealed in accordance with Division 26.

2.3 FINISHES

A. Fabric Finish:
   1. Woven fabrics, Class A Flame Spread rated in accordance with ASTM E84.
   2. Manufacturer's standard type.
   3. Color as selected from manufacturer's standard range.

B. Metal Surfaces: Provide manufacturer's standard clear anodized aluminum finish baked enamel finish in color selected by Architect at exposed to view metal surfaces of panels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Verify that support components are accurately placed prior to beginning work.

3.2 PREPARATION

A. In path of partition, level floor with header to tolerance of plus or minus 1/16 inch across opening; grind or fill floor as necessary.

3.3 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Install partition with electric operator, wiring, and controls in accordance with manufacturer's written instructions and approved shop drawings and supplemented by ASTM E557.

C. Securely attach and brace overhead track and supports to structure.

D. Coordinate installation of a electric service.

3.4 FIELD QUALITY CONTROL

A. After installation, conduct visual inspection in presence of Architect for effectiveness of seals.

B. Perform visual inspection with room lights turned on one side of partition and space on opposite side darkened. There shall be no light leakage from lighted space to darkened side. Make necessary adjustments and repeat test from opposite side.

C. If Architect finds reason to question effectiveness of STC requirement of installed partition, services of independent consultant or testing laboratory may be retained to perform field examinations or tests.

D. If installation is found significantly deficient by services of independent consultant or testing laboratory, correct Work to meet specified requirements and pay for initial as well as re-inspection.

3.5 ADJUSTING

A. Adjust panels and hardware for smooth operation and effective seals without binding. Leave system level and plumb.

3.6 CLEANING

A. Clean finish surfaces and accessories in accordance with manufacturer's directions and Section 017400.

3.7 DEMONSTRATIONS

A. Upon completion of installation, demonstrate use of motor operated operable partitions to Owner.

END OF SECTION

SECTION 102600

WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Surface applied corner guard for service areas.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select adhesives and sealants meeting LEED requirements.

1.2 SYSTEM REQUIREMENTS

A. Performance Requirements:
   1. Comply with UL 723 Class I characteristics as follows:
      a. Flame Spread: 25 maximum.
      b. Smoke Developed: 450 maximum.
   2. When used as part of fire rated assembly, provide devices capable of maintaining specified or indicated hourly rating when tested in accordance with ASTM E119.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit manufacturer's descriptive technical data including test performance data and performance characteristics for each product.

C. Shop Drawings: Show built-in items, including sizes, types, materials, construction, finishing, anchoring, accessories, and preparation for installation of corner guards.

D. Samples: Submit actual samples of standard and optional vinyl colors, stainless steel for Architect's selection.

E. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Qualification data: Manufacturer's qualification data.
   3. Manufacturer's instructions.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Adhesives and sealants.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture and fabrication of wall protection devices with 5 years experience.

B. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

PART 2 - GENERAL

2.1 MANUFACTURERS

A. Acceptable Resilient Manufacturers:
   1. Arden Architectural Specialities, Inc., Saint Paul, MN.
   2. Balco/Metalines, Wichita, KS.
   3. Construction Specialties, Inc., Muncy, PA.

4. IPC Door and Wall Protection Systems, Muskego, WI.
5. Pawling Corporation, Wassaic, NY.

2.2 CORNER GUARDS

A. Surface Mounted Metal:
   1. Design: Surface applied with surface fasteners.
   2. Material: Stainless steel.
   3. Size: 3-1/2 by 3-1/2 inches by full height 48 inches high.
   4. Thickness: 16 gage.
   5. Finish: No. 4 satin.
   6. Corners: Use custom product at other than 90 degree and 135 degree corners.

2.3 ACCESSORIES

PART 3 - PRODUCTS

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify that substrate finishes are complete and attachment devices in hollow walls are accurately located.

3.2 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Locate devices where indicated.

C. Stop corner guards at heights indicated. If no heights are indicated, extend full height to ceiling to 48 inch above finished floor.

D. Use attachment devices or adhesive as specified and as recommended by manufacturer.

3.3 ADJUSTING

A. On flush mounted devices, verify that device is flush with adjacent wall surface. Adjust for proper fit and alignment.

3.4 CLEANING

A. Remove protective coverings from devices at final cleaning stage.

END OF SECTION

SECTION 102813

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Project is a registered US Green Building Council “LEED” project.
   1. Select adhesives and sealants meeting LEED requirements.

B. Adhesives and sealants shall meet or exceed the VOC and chemical component limits of SCAQMD Rule 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit manufacturer's catalog cut sheets, and data sheets.

C. Shop Drawings: Submit setting drawings, templates, instructions, and directions for installing anchorage devices and cut-out requirements in other work.

D. Submit following Informational Submittals:
   1. Certifications specified in Quality Assurance article.
   2. Manufacturer's instructions.

E. Closeout Submittals:
   1. Submit under provisions of Section 017800.
   2. Maintenance data.

F. LEED Data: Provide special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
      a. Sanitary Sealant

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with Authorities Having Jurisdiction to accommodate barrier free design.

B. Certification: Provide verification of grab bar strength and installation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Pack accessories individually with protective wrappings.

1.5 KEYING

A. Dispense units keyed alike, furnish six keys. Key coin boxes separately from dispensing unit; furnish 6 keys.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. A and J Washroom Accessories, Newburgh, NY.
   2. American Specialties, Inc., Yonkers, NY.
   3. Bobrick Washroom Equipment, Inc., North Hollywood, CA.
   4. Bradley Corporation, Menomonee Falls, WI.

B. Bobrick accessories are specified, but items of equivalent design, sightlines, construction, size, function and capacity by manufacturers listed in paragraph above are also acceptable.

2.2 MATERIALS

A. Stainless Steel:
   1. Sheet: ASTM A240, UNS S30400, 22 gage, except where specified otherwise.
   2. Tubing: ASTM A269, UNS S30400.

B. Sheet Steel:
   1. Cold rolled: Commercial quality ASTM A336, 20 gage minimum. Surface preparation and metal pretreatment as required for applied finish.
   2. Galvanized steel: ASTM A653, G60 zinc coating.

C. Aluminum Casting: ASTM B85.

D. Fasteners: Screws, bolts, and other devices of same material and finish as accessory item, or of galvanized steel complying with ASTM A123 where concealed; theft-proof design at exposed conditions.

E. Expansion Shields: Type as recommended by accessory manufacturer for component and substrate.

F. Sanitary Sealant:
   1. One part silicone conforming to ASTM C920, Type S, Grade NS..
   2. Color: White.
   3. Acceptable Products:
      a. 786 Mildew-Resistant Silicone Sealant, The Dow Chemical Company.
      b. Sanitary 1700, General Electric Silicones.
      c. Tremsil 200 Sanitary, Tremco

G. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
   1. Current requirement refers to the date on which the materials are installed in the building.
   2. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to http://www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
   3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

H. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
   1. Adhesives shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
   2. Sealants shall meet or exceed the VOC and chemical component limits of Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.

2.3 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form exposed surfaces from single sheet of stock, free of joints.

C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

D. Back paint components where contact is made with building finishes to prevent electrolysis.

E. Shop assemble components and package complete with fasteners, anchors, and fittings.

F. Provide anchor plates, adapters, and anchor components necessary for installation.

2.4 FACTORY FINISHING

A. Galvanizing After Fabrication: ASTM A123, 1.25 ounce per square yard.

B. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

C. Stainless Steel: No. 4 satin luster.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings and instructed by manufacturer.

C. Check openings for plumbness of blocking and frames.

D. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site at appropriate time for installation.

B. Provide templates and rough-in measurements as required.

C. Verify exact location of accessories for installation.

D. Protect adjacent or adjoining finished surfaces and work from damage during installation.

E. Coordinate work with placement of wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

F. Supply rough-in data in sufficient time to be built into other work.

G. Do not install accessories until room finishes are completed.

3.3 INSTALLATION

A. Install in accordance Section 017300 and approved shop drawings.

B. Install in accordance with manufacturer's instructions and with accessibility requirements of ADA and ANSI A117.1.

C. Mount toilet accessories required to be accessible in accordance with California Building Code Section 1118B.

D. Toilet paper and feminine napkin dispensers, and similar items located on grab bar side of accessible toilet room or stall shall not project more than 3 inches from finished wall surface nor be located closer than 1-1/2 inch clear of tangent point of grab bar.

E. Locate accessories in order that they do not interfere with door swings or use of fixtures. Install accessories after wall finishes have been completed.

F. Install plumb, level, and securely anchored to substrate.

G. Anchor accessories with bolts, plates, and approved type fasteners.

H. Install surface mounted accessories to backup material with toggle bolts, plumb and align.

I. Grab bars:
   1. Anchor grab bars to drywall with concealed 16 gage steel anchor plates.
   2. Install grab bars in manner to support 250 pound hanging load placed at any point along bar length.

J. Adjust accessories for proper operation and smooth mechanical function.

K. Clean and polish exposed surfaces after removal of protective coverings.

3.4 SCHEDULE OF ACCESSORIES

A. Furnish and install accessories as listed on the Drawings.

END OF SECTION

SECTION 104400

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fire extinguisher cabinets.
   2. Fire extinguishers.
   3. Mounting brackets.

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled materials.
   2. Select locally or regionally fabricated products wherever possible.

1.2 DEFINITIONS

A. Where indicated on Drawings, abbreviation "FEC" defines fire extinguisher and cabinet and abbreviation "FE" is for fire extinguisher without cabinet.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Furnish manufacturer's descriptive literature.
   2. Include physical dimensions, operational features, color and finish, anchorage details, material descriptions, and type of hardware.

C. Shop Drawings: Include rough-in measurements, locations, and details for cabinets.

D. Samples: Submit sample of manufacturer's standard finish and color on actual base metal.

E. Submit following Informational Submittals:
   1. Certificates: Submit certification attesting compliance with UL and NFPA requirements.
   2. Manufacturer's instructions: Submit installation instructions for fire extinguisher cabinets.

F. LEED Data: Provide special submittals conforming to Section 01351 Environmental Procedures for the following:
   1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
      a. Stainless Steel
   2. LEED Credit MRc4: Provide documentation certifying the percentage of post-industrial and post–consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Stainless steel
   3. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
      a. Stainless steel

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain products in this Section from one manufacturer.

B. Certifications:
   1. Provide extinguishers which are UL listed and bear UL rating for type and classification.
   2. Conform to CCR, Title 19 requirements for extinguishers.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

1.6 PROJECT CONDITIONS

A. Environmental Requirements: Do not store products subject to freeze damage in environments where damage could occur.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. J. L. Industries, Bloomington, MN.
   2. Larsen's Manufacturing Company, Minneapolis, MN.
   3. Potter Roemer, Cerritos, CA.

2.2 FIRE EXTINGUISHERS

A. Food Service Kitchen Wet Chemical Fire Extinguisher Type 2A:K: Wet Chemical Type with Pressure Gage, designed specifically for kitchen grease fire hazards.
   1. Special potassium acetate based chemical, low PH agent, which leaves no chemical residue to clean up.
   2. Capacity: 2.5 gallons.
   3. UL Rating: 2A:K.
   4. Acceptable Product: WC 2-1/2, Larsens.
   5. Mounting: Wall Brackets in Food Service Kitchen.

B. Multi-Purpose Dry Chemical Type (Siliconized Mono Ammonium Phosphate) with Pressure Gage.
   1. Capacity: 5.0 pounds.
   2. UL Rating: 2A-10B:C.
   3. Acceptable Product: MP5, Larsen's Manufacturing Company, Minneapolis, MN.

2.3 CABINETS

A. Fire Extinguisher Cabinet:
   1. Formed sheet metal 20 gage prime painted steel, epoxy finished interior.
   2. Recessed type.
   3. Cabinet Construction: Nonrated, except provide rated cabinet when recessed into rated partitions of same rating as partition.
   4. Size to accommodate fire extinguisher and accessories.

B. Trim: Flat, primed painted steel.

C. Door:
   1. Material: Prime painted steel.
   2. Thickness: 20 gage minimum, reinforced for flatness and rigidity.
   3. Latch: Roller latch.
   4. Door style: Vertical view panel.

D. Glass: 1/8 inch thick.

E. Mounting Hardware: Appropriate to cabinet.

F. Graphic Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect. Individual press-on letters.

2.4 ACCESSORIES

A. Fire Extinguisher Brackets: Larsen's Manufacturing Company, Minneapolis, MN "B" series full length wall brackets, size as required for cylinder used.

2.5 FABRICATION

A. Form body of cabinet with tight inside corners and seams.

B. Predrill holes for anchorage.

C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.

D. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon roller type catch.

2.6 FINISHES

A. Extinguisher: Red enamel.

B. Cabinet Trim and Door: UNS S30400 stainless steel with No. 4 finish.

C. Cabinet Interior: White epoxy.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify rough openings for cabinets are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. Install cabinets plumb and level in wall openings at locations indicated on Drawings.

C. Provide Fire Department Valve Box where indicated on Drawings.

D. Securely attach cabinets and mounting brackets in place to wall blocking.

3.3 IDENTIFICATION

A. Identify fire extinguisher locations with following methods:

1. For fire extinguisher locations without cabinets, use vertical decal spelling "FIRE EXTINGUISHER" applied to adjacent wall surface.
2. For fire extinguisher cabinet locations, use individual press-on letters, in vertical format, of contrasting color to cabinet, spelling FIRE EXTINGUISHER.

END OF SECTION

SECTION 105113

METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Double tier metal lockers

B. This Project is a registered US Green Building Council “LEED” project.
   1. Select materials to maximize use of recycled materials.
   2. Select locally or regionally fabricated products wherever possible.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit technical data and descriptive literature for each product.

C. Shop Drawings: Submit drawings indicating locker locations, types, sizes, configurations, layout of groups, numbering, and accessories. Indicate details of fillers, trim, base, and accessories.

D. Samples: Submit samples on metal substrate of each color in manufacturer's standard color range for Architect's selection.

E. Manufacturer's Instructions: Submit detailed installation instructions.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.

1.4 FIELD SAMPLES

A. Provide field samples in accordance with Section 014500.

B. Provide locker assembly of each type, complete with specified options and accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

1.6 EXTRA STOCK MATERIALS

A. Provide touch-up paint for each color used.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Lyon Metal Products, LLC, Aurora, IL.
   2. Penco Products, Inc., Oaks, PA.
   3. Republic Storage Systems Company, Inc., Canton, OH.

2.2 STANDARD METAL LOCKERS

A. Barrier Free Accessible Lockers: Provide 5 percent minimum of lockers for each sex with barrier free accessible features.

B. QType: Double tier, with legs.

C. Unit Size: 12 inches wide by 18 inches deep by 72 inches high.

D. Sheet Steel:
   1. Steel: ASTM A653, one-coat electroplated zinc cold rolled carbon steel.
   2. Surface: Free from buckle, scale, imperfections, and capable of taking high grade enamel finish.

3. Minimum Gages:
   a. Front frames and doors: 16 gage.
   b. Body tops, bottoms, sides, backs, and shelves: 24 gage minimum, adequately flanged to provide rigidity.
   c. Fillers, exposed ends, trim: 20 gage minimum.

E. Hardware:
1. Locking and Latching Devices:
   a. Positive, automatic pre-locking type, complete with tamper-proof locking bar with silencers, and zinc die cast handle parts.
   b. Device operates by means of standard surface mounted latch handle with padlock.
   c. Latch is one-piece, self contained, spring steel device.
   d. Provide operating mechanism that is CBC and ADA compliant for barrier free access.
2. Hinges: Three on doors higher than 36 inches; 2 per door for 36 inches and shorter; 2 inch wide, 5 knuckle, tight pin, welded to frame and riveted to door.
3. Bumpers: Rubber type, mounted to door frame.

F. Accessories:
1. Hooks: One double-prong ceiling hook and two single-prong wall hooks of cadmium-plated steel or cast aluminum for single and double tier units.
2. Base: Zinc coated steel, manufacturer's standard color to match locker, flush style.
3. Filler and boxed end panels: Manufacturer's standard.
4. Number Plates: Aluminum with etched figures, 1/2 inch high minimum attached at top of door.
5. Hat Shelf: One per single tier units.
6. Provide barrier free accessible lockers with applied decal next to latch showing universal symbol of accessibility.
7. Provide barrier free accessible lockers with bottom shelf at 15 inches above finished floor.

G. Fasteners: Cadmium, zinc, or nickel plated steel; no exposed bolts or rivet heads on front of lockers or frames.

H. Fabrication:
1. Frames: Totally welded overlapping construction, channel formed with double thickness lock and catch housing, and interlocked intermediate cross members.
2. Doors: Self closing channel box formed with reinforced ends returned and welded with manufacturer's standard louver pattern.
3. Body:
   a. Flanged, reinforced.
   b. Provide finished end panels for lockers with ends exposed to view.

I. Acceptable Product: Standard Locker by Republic Storage Systems Company, Inc., Canton, OH.

2.3 FINISHES

A. Lockers, Base, and Trim: Manufacturer's standard baked enamel in color selected by Architect from manufacturer's full range of standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Install plumb, level, rigid, and flush.

C. Space fastenings 48 inches OC maximum and apply through backup reinforcing plates where necessary to prevent metal distortion. Conceal fasteners wherever possible. Use anchorage devices appropriate to suit materials encountered.

D. Bolt adjoining locker units together to provide rigid installation.

E. Install box end panels, filler panels and other closures for complete installation and to close off openings.

3.3 ADJUSTING

A. Touch-up marred finishes.

B. Use only materials and finishes recommended or furnished by locker manufacturer.

C. Adjust doors and latches to operate easily without bind.

END OF SECTION

SECTION 107500

FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete.

1.2 SYSTEM REQUIREMENTS

A. System Description:
   1. Type: Ground mounted.
   2. Pole Design: Cone tapered.
   3. Exposed Height: 35 feet measured from top of base.
   4. Halyard: Internal hand crank operated.

B. Structural Requirements: Design flagpoles, bases and anchorage devices to resist without permanent deformation, 90 mph wind velocity, non-resonant, in unflagged condition.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Provide manufacturer's specifications and descriptive literature on products proposed for use.

C. Shop Drawings:
   1. Indicate general layout, dimensions, finishes, foundation and base system, jointing, anchorage and support conditions, cleats, halyard boxes, trucks, finals, base collar other accessories.
   2. Give detailed dimensions and locations and imposed loads.

D. Samples: Two, 2 inch by 4 inch samples of actual finish selected on specified base material.

E. Submit following Informational Submittals:
   1. Qualification data: Submit installer's qualifications verifying years of experience; include list of completed projects having similar scope of Work identified by name, location, date, reference names and phone numbers.
   2. Manufacturer's instructions: Detailed installation instructions of products proposed for use.
   3. Certification: Submit certification that flagpoles, bases and anchorage devices are capable of resisting, without permanent deformation, 90 mph wind velocity, non-resonant, in unflagged condition.

F. Closeout Submittals: Operation Data; operating instructions for halyard system.

1.4 QUALITY ASSURANCE:

A. Installer Qualifications: Experienced in this type of installation with minimum 3 years experience successfully installing similar systems.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.

C. Protect products on site from damage and moisture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. American Flagpole, Abingdon, VA.
   2. Concord Industries, Inc., Addison, TX.

3. John Ewing and Company, Inc., Buffalo, NY.

2.2 MATERIALS

A. Aluminum: Seamless extruded tubing, ASTM B241; 6063 alloy, T6 temper.

2.3 COMPONENTS AND ACCESSORIES

A. Finial Ball: Aluminum, flush seam, diameter to match pole butt diameter.

B. Truck Assembly: Cast aluminum; revolving type with stainless steel ball-bearings, non-fouling, waterproof.

C. Flags: by Owner.

D. Internal Halyard:
   1. Furnish poles with internal halyard system.
   2. Hand Crank: Manually operated, removable type.
   3. Incorporate stop devices and removable handle.
   4. Provide stainless steel braided aircraft cable.
   5. Provide plastic coated counterbalance and sling.
   6. Provide reinforced flush access door secured with cylinder lock.

E. Connecting Sleeves for Multiple Section Poles: Same material as pole, precision fit for field assembly of pole, concealed fasteners.

F. Concrete: Refer to Section 033000.

G. Sand: Dry masonry sand.

2.4 MOUNTING ASSEMBLIES

A. Ground Set Foundation Assembly:
   1. Foundation Tube Sleeve: AASHTO M-36, corrugated 16 gage steel, galvanized, depth as recommended by manufacturer for pole heights indicated.
   2. Flashing Collar/Base: Cast aluminum material of manufacturer's standard profile, of size to accommodate butt diameter of flagpole.
   3. Centering Wedges: Four internal steel wedges, welded to support plate and foundation sleeve for centering of flagpole.
   4. Ground Spike: 3/4 inch diameter steel spike, 18 inches minimum length; welded to foundation sleeve plate.
   5. Foundation Base Plate: 1/4 inch thick steel, 4 inches larger than inside diameter of ground sleeve, welded to ground spike.
   6. Setting Plate: 6 inch square welded to ground spike at least 6 inch below base plate at bottom of concrete foundation.

2.5 FABRICATION

A. Cone tapered:
   1. Seamless, uniform, straight line tapered section above cylindrical butt section.
   2. Taper: Full length of run at approximately 1 inch per 5.5 feet of length.
   3. Provide internal splicing, self-aligned sleeve of same material as flagpole for snug fitting, precision field joints.

2.6 FINISHES

A. Metal Surfaces in Contact with Concrete or Sand: Asphaltic or coal-tar coating of type recommended by manufacturer.

B. Concealed Steel Surfaces: Galvanized to 1.25 ounce per square feet.

C. Aluminum: Anodized to 0.7 mil thickness in clear color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

B. Verify that concrete foundation supports are ready to receive work and dimensions are as instructed by manufacturer.

C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.3 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Ground Set Poles:

1. Excavation: Excavate for foundation concrete to neat clean lines in undisturbed soil. Provide forms where required due to unstable soil conditions. Remove wood, loose soil, rubbish and other foreign matter from excavation, and moisten earth before placing concrete.
2. Refer to Section 033000 for concrete mix and placing procedures. Trowel exposed surfaces to smooth dense finish with positive slope away from pole base.
3. Install foundation sleeve/plate and centering wedges for flagpoles base set in concrete foundation. Fill foundation tube sleeve with sand and compact after plumbing pole.
4. Apply sealant on top 1/2 inch of foundation sleeve.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1 inch.

3.5 ADJUSTING AND CLEANING

A. Clean surfaces.

B. Adjust operating devices so that halyard functions smoothly.

END OF SECTION

SECTION 108113

BIRD CONTROL DEVICES

PART 1 – GENERAL

1.1 SYSTEM DESCRIPTION

A. Design Requirements: Measure carefully the width of the surface and determine the appropriate mounting system as determined by site conditions and mounting surface.

1.2 SUMMARY

A. Provide labor, materials and supervision to install Bird Wire to the surface of the building structure. The bird wire shall stop pigeons, seagulls, and larger birds from landing and roosting on the building structure.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish products from one manufacturer for entire project.
B. Obtain all technical information from the manufacturer.
C. Utilize labor or Bird-B-Gone Authorized Installers who are knowledgeable in Bird-B-Gone product installations.
D. Installer shall visit the site to gather all information of existing site conditions.

1.4 SUBMITTALS

A. Product Data: Submit all descriptive information from the manufacturer including catalogs, installation instructions and other descriptive material.
B. Provide Warranty: Material and installation.
C. Provide Samples: Each type of hardware, including proposed fastening methods.
D. Provide statement by official indicating that they are a certified installation company.

1.5 PRODUCT HANDLING

A. Protect Bird-B-Gone products from damage before, during and after the installation.

1.6 PROJECT CONDITIONS

A. Coordination: Furnish all anchoring devices required to fasten system to and around existing building structure. Coordinate installation with existing conditions and within on–site tolerances.

B. Visit site and field measure prior to fabrication and delivery of materials.

1.7 WARRANTY

A. Product shall carry a minimum 5 year guarantee against U.V. breakdown.
B. Installation shall be guaranteed for 2 years.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

Manufacturer:
Bird-B-Gone, Inc.
Bird Wire 2000
23918 Skyline
Mission Viejo, CA 92692
Tel: 800-392-6915 or 949-472-3122
Fax: 949-472-3116
P.O.C.: Bruce Donoho

2.2 PRODUCT DESCRIPTION

A. Model Designation: Bird Wire 2000™ - Modular Post and Wire System

2.3 MATERIAL

A. Wire: 0.45mm 1 x 7 stainless steel wire, U.V. stabilized clear nylon coated to 0.7mm finished diameter.
B. Crimps: Nickel-plated copper.
C. Metal Hardware: 316-grade stainless steel.
D. Plastic Hardware: High impact U.V. stabilized thermoplastic.
E. Number of Rows: As determined by the manufacturer and based on project conditions.
F. Mounting System: As determined by the manufacturer and based on project conditions.

2.4 MOUNTING SYSTEMS

A. Wood, Concrete, Brick or Stone: Insert posts into the appropriate mounting base.
   1. Anchor Rivets and Split Pins: Drill into surface. Length of attachments should be comparable with the depth of mounting surface.
   2. Stick-on-bases: Use outdoor construction adhesive along with self-tapping screws to secure installation. Adhesive should be allowed to dry overnight.
   3. Stainless Steel Base with posts included: Use outdoor construction adhesive along with self-tapping screws to secure installation. Adhesive should be allowed to dry overnight.

B. Sheet Metal, Steel or Marble: Use stick-on bases with an outdoor construction adhesive. Adhesive should be allowed to dry overnight.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine the installation area and note any detrimental or hazardous work conditions. Notify contracting officer or inspector of the detrimental work conditions.
B. Do not proceed with the installation until conditions are corrected.

3.2 SURFACE PREPARATION

A. Surface should be thoroughly cleaned and free of bird droppings, nesting materials, rust, peeling paint or other debris.
B. Remove or repair article that may damage Bird Wire 2000™ after installation, including overhanging foliage, brush and loose parts on the structure.

3.3 INSTALLATION

A. Install Bird Wire 2000™ as recommended by the manufacturer.
B. Bird Wire 2000™ should be installed correctly, covering the entire depth of the surface, not just the perimeter.
    1. Follow contours and angles closely.
    2. Space materials in accordance with manufacturer's recommendations.

3.4 INSPECTION

A. Visually inspect Bird Wire 2000™ for any signs of poor installation, including loose screws, fasteners or un-removed debris.
B. Immediately correct and repair as necessary.

END OF SPECIFICATIONS

DIVISION 11

EQUIPMENT

SPECIFICATION 112423

BUILDING MAINTENANCE EQUIPMENT (BME)

PROVIDING ACCESS FOR PERSONNEL TO PERFORM MAINTENANCE

710 Wilshire, Santa Monica, CA

PART 1- GENERAL

1.1 SCOPE

A. Furnish and install Building Maintenance Equipment (BME) for accessing the building façade and other elements in accordance with requirements of the Contract Documents consisting of drawings and specifications.

1.2 RELATED SECTIONS AND WORK PROVIDED BY OTHERS

A. Related Sections:

1. Cast in place Concrete: Section 03300, Installation of embedded items
2. Structural Precast Concrete: Section 03411, Concrete pavers at all roofs / terraces
3. Structural Steel: Section: Section 05120, Reinforcing and/or Additional Steel or Catwalks
4. Metal Framed Curtainwall: Section 08910, Platform stabilization / vertical guide tracks (if required)
5. Electrical Wiring, conduit and outlets: Division 16, see products for requirements

B. Related Work by Others:

1. Two-way radio communication system, provided by building management
2. Material hoists and/or site cranes, provided by the General Contractor
3. Fresh water supply
4. Flashing and sealing
5. Concrete roof pavers
6. Installation of storage tiedown anchors
7. Cutting and patching (repair) of roofing, installation, waterproofing and metal deck
8. Electrical outlets with strain relief anchors
9. Personal fall protection equipment including harnesses, lanyards and rope grabs, provided by the equipment user.
10. Access doors, panels, hatches, ladders, etc by building designer.
11. Supply and installation mullion track and/or installation of intermittent stabilization anchors by curtain wall supplier.

1.3 CODES AND STANDARDS

A. All work and equipment, its performance, use, inspection, testing and maintenance shall comply with the most stringent requirements of all applicable codes and jurisdictions, including but not limited to the most recent amendment of the following:

1. Occupational Safety and Health Act (OSHA): OSHA Part 1910, paragraph 1910.66 “Power Platforms for Building Maintenance.”
2. American Society of Mechanical Engineers ASME/ANSI A120.1 “Safety Requirements for Powered Platforms for Building Maintenance” 2001 (or latest revision date).
3. International Window Cleaners Association IWCA/ANSI I-14.1 - Window Cleaning Safety 2001 (or latest revision date)
4. National Electric Code, Electrical components shall be UL listed.

5. American Institute of Steel Construction (AISC): AISC “Load and Resistance Factor Design Specification for Structural Steel Buildings”, including the “Commentary” thereto and AISC “Code of Standard Practice for Steel Buildings and Bridges”, including the “Commentary” thereto.
6. American Welding Society (AWS): D1.1 “Structural Welding Code, Steel”, and D1.2 “Structural Welding Code, Aluminum.
7. California General Industry Safety Orders (GISO) Title 8 Articles five (5) and six (6).
8. Aluminum Association Specification for Aluminum Structures.

1.4 **BID PROPOSAL SUBMITTALS**

A. Proposal: Include with the bid proposal for analysis by the Owner the following:

1. Product Data: For standard manufactured products submit product data describing characteristics. All items that are uncertain before the equipment has been designed and which others must furnish should be described in this submittal.
2. Maximum electrical power requirements.
3. Weights of all the major assemblies.
4. Preliminary reactions on the structure from all components.

1.5 **CONTRACT SUBMITTALS**

Submit the following to the General Contractor/Building Manager for review and approval.

A. Dimensioned Shop Drawings: Before beginning fabrication of equipment submit scaled shop drawings showing layout, profiles and product components, including anchorage, accessories and finish, along with general arrangement of the equipment and their working positions.

B. Load Requirements: Indicate loads imposed on the building structure and curtain wall.

C. Structural calculations prepared and certified by a Licensed Professional Engineer registered in the State where the project is located.

D. Location and characteristics of electrical connections upon requested.

E. Test Reports: Certified test reports showing compliance with specified material characteristics and physical properties.

F. Certificate of Compliance signed by manufacturer certifying system complies with specified performance characteristics and criteria, and applicable codes.

G. Operation and Maintenance Manuals: Submit 3 sets of the Operation and Maintenance Manuals that are bound and neatly labeled describing operation and maintenance of all equipment installed; include:

1. Methods for maintaining installed products
2. Precautions against cleaning materials and methods detrimental to finishes and performance.
3. A detailed rescue plan.
4. Three (3) copies of the warranty documents specified.
5. A sample inspection log for Owner's use in recording inspections; include recommended list of daily, weekly, periodic, and biannual inspections.

H. Project Record Documents: Submit project record (“as-built”) drawings showing actual installed locations and configuration, and record specifications documenting all changes to original design criteria and other specification requirements. Include in the “as build” drawings wiring diagrams showing all electrical connections of equipment, including a legend sheet.

1.6 **QUALITY ASSURANCE**

A. Building Maintenance Equipment Contractor is solely responsible for the quality control of the work. Comply with the requirements specified in section “Field Quality Control”. Carry specific liability insurance in the amount of $10,000,000 to protect against product/system failure.

B. Comply with applicable requirements of the laws, codes, ordinances and regulations of the authorities having jurisdiction. Obtain necessary approvals from all such authorities.

C. Required tests shall be made in the presence of the authorized representative of such local authorities. The Building Maintenance Equipment Contractor shall issue a Certificate of Compliance of the whole installation and of the testing performed.

D. An approved equivalent contractor (manufacturer) shall be a firm whose main concern and business is solely involved in the engineering design, manufacture and installation of Building Maintenance Equipment, and who has been actively engaged in this business for no less than ten (10) years.

1.7 **DELIVERY, STORAGE AND HANDLING**

A. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.8 **WARRANTY**

A. Provide manufacturer's warranty for one (1) year against defects in materials and installation, executed by an authorized company official.

1.9 **OPERATIONAL INSTRUCTIONS**

A. The Building Maintenance Equipment supplier shall instruct the Owner’s Representatives and selected User Personnel in the proper usage of the BME. A representative of the BME supplier shall, at a time selected by the Owner, spend one (1) man-days as needed at the building furnishing this instruction.

B. Building Maintenance Equipment training attendance certificates are to be issued by the Building Maintenance Equipment supplier to each of the Owner’s Representatives and selected User Personnel upon completion of training.

1.10 **DESIGN REQUIREMENTS**:

A. Wind Pressure: The installation shall be designed to withstand 25 miles per hour wind velocities while being used for normal operations and shall be fully operational at wind velocities up to 50 miles per hour. They also shall be designed to withstand 100 miles per hour wind velocity when in their secured stored positions.

B. The exposed areas subjected to wind pressure shall be the total areas of all portions of the exposed parts with no shielding effect of one element by another where the distance between elements is four times or more than the smaller projected area of the windward element.

C. The installation shall be designed to provide continuous contact between the platform and the structure as the platform descends and ascends.

D. All Building Maintenance Equipment shall be designed by or under the direction of a Professional Engineer registered in the state where the project is located. A Professional Engineer registered in the state where the project is located shall verify all foreign produced equipment.

E. All structure assemblies and components shall be designed with a safety factor of 4:1 safety against failure and to be so certified unless otherwise specified.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

Building Maintenance Equipment Manufacturer: Provide Building Maintenance Equipment designed, engineered, manufactured, installed and commissioned by:

1. Tractel Ltd. – Swingstage Division Ph (416) 298-8822
   1615 Warden Avenue. 1-800-465-4738
   Toronto, Ontario, Canada, M1R 2T3 Fax (416) 298-1053

2. An approved equivalent manufacturer shall be a firm whose main concern and business is solely involved in engineering, design, manufacture and installation of Permanent Building Maintenance Equipment and must show proof of products insurance. Companies such as miscellaneous metal fabricators, who are not normally designing and manufacturing Permanent Building Maintenance Equipment, are not permitted to bid.

3. For substitutions please see section 01600 and Substitution Request form.

2.2 GENERAL REQUIREMENTS

A. Components shall be constructed of heat-treated aluminum alloy, stainless steel, or hot-dipped galvanized structural steel. Dissimilar metals, when used, shall be protected against electrolytic actions. All connectors shall be stainless steel unless otherwise noted. Certified welders shall make all welds and they shall examine all welds by non-destructive testing.

B. Components in contact with façades and the platform casters to be a non-marking and scuff resistant material.

C. The exterior finish of all roof carriages and all other factory painted assemblies shall be machinery enamel of a color as directed by the Architect and/or Owner. All aluminum assemblies and stainless steel assemblies shall be of natural color; mill finish. All carbon steel components shall be hot-dipped galvanized.

D. All hardware, clips, bolts, nuts, washers, etc. shall be stainless steel.

E. All electrical equipment shall have phase protection.

2.3 DESIGN

All structural members are to be designed with a minimum 4:1 safety factor based on ultimate strength and normal operating conditions unless otherwise noted. All stresses and deflections are limited in accordance with governing codes and regulations.

2.4 COMPONENTS OF THE WORK

A. The BME Contractor shall furnish and install the equipment in order to perform building maintenance; refer to proposal which shall include, as a minimum, but not be limited to:

1. Davit Pedestals System and required Fastening Hardware
2. Davit Bases and required Fastening Hardware
3. Portable Davit Bases, Davit Arms, Davit Raising Winch

4. Safety Tieback Anchors for controlled descent / fall protection
5. Powered Modular Stage Platform or Powered Workcage
6. Platform Guides, vertical guide track by others

2.5.1 **DAVIT PEDESTALS AND FASTENING HARDWARE**

A. Sufficient hot dip galvanized permanently attached steel davit pedestals shall be supplied for mounting to structure with appropriate stainless steel fastening hardware / cast-in-anchor bolt cage (if required). Each davit pedestal will be accurately machined to receive the portable davit base. Each shall be shimmed as necessary during installation to steel / cast-in-anchor bolt cage.

Tractel product number:
PBX-EP-XX – Davit Pedestal, Embedded Anchor Bolt

2.5.2 **DAVIT BASES AND FASTENING HARDWARE (New York Style)**

A. Sufficient hot dip galvanized permanently attached steel davit bases shall be supplied for mounting to pre-installed davit pedestals with appropriate stainless steel fastening hardware. Each base is to be fitted with a safe attachment point for securing the worker's safety line. The davit bases will be accurately machined to receive the portable davit arms. They must be shimmed as necessary during installation to steel davit pedestals.

B. Sufficient hot dip galvanized steel davit pedestals are to be supplied and installed by others.

C. Tractel product number: PP5-XD

2.5.3 **PORTABLE DAVITS**

A. Provide two-piece, tip-up, rotating, mechanically raised, standard aluminum davits. The davits are to be designed to allow workers to mount the maintenance platform on the roof level and swing the platform outboard over the parapet or railing. Davits shall be provided with wheels or a cart for transporting between bases. In the locations noted, davit arms shall be permanently installed in the bases and capable of being lowered down, with mechanical assist, when not in use.

B Portable Davits: are comprised of two sections. The vertical mast section is to be constructed from high strength aluminium tubing. At the upper end of the mast an integral pivot pin with safety toggle facilitates engagement and securing of the horizontal boom portion of the davit boom. The davit boom is to be extruded aluminium complete with trolleys with sealed bearings and position retaining devices.

1. The davit mast shall be designed to engage the portable davit bases / fixed davit bases while in the horizontal position. Once the mast is pinned to the portable davit base / fixed davit base the boom portion of the arm is attached and then the entire assembly is pivoted into the upright position. Safety pins are to be provided to allow positive engagement with the davit base to secure the davit in its vertical working position.
2. A self-lubricating, upper bearing, roller collar shall be provided on the boom to ease boom rotation under all loading conditions.
3. Davit boom and mast shall be designed as separate sections. Carrying handles are to be provided on the davit booms and masts: along with transporting wheels near the base of the davit masts to ease transfer.
4. The davit masts shall be of sufficient height to permit the booms to rotate and land the suspended platform on the roof for transfer to subsequent service drop positions.

5. The davits shall be designed to support a safe working load of 1150 lbs per arm. Two davits working together must be rated to support a total of 2300 lbs.

6. Tractel product number DAA-XXX-XXX.

C One portable davit-raising winch shall be supplied to provide a mechanical means for raising the davit from a horizontal position to a vertical work position. The manually operated hand winch shall incorporate a load brake system.

D Signage: a metal sign must be attached to davit stating the maximum load capacity.

2.5.4 **FLUSH or PORTABLE DAVIT BASES**

A. Sufficient hot dip galvanized steel davit bases shall be supplied for attachment to davit pedestals. The davit bases are to be accurately machined to receive the portable davit arms.

Tractel product number:
PPX-EP-XX – Flush Davit Pedestal, Embedded Anchor Bolt

2.5.5 **SAFETY TIEBACK ANCHORS**

A. Furnish and install sufficient tieback anchors of the following types as required:

B. All tieback anchors are to be designed for 5000# (5400# in California) ultimate load in any direction at the attachment point.

C. All hardware, clips, bolts, nuts, washers, etc. shall be stainless steel.

2.5.6 **COMMUNICATION EQUIPMENT**

A. Communication equipment will be provided for each operator for use in an emergency. The communication equipment shall be Owner furnished walkie-talkies to maintain contact with building personnel.

PART 3 – EXECUTION

3.1 **HOISTING**

A. The BME Contractor shall be responsible for all manpower required during equipment hoisting, and shall also be responsible for coordinating the location of his equipment on the roof as required so as not to interface with other roof construction.

3.2 **INSTALLATION**

A. Furnish and install all Building Maintenance Equipment and components in strict accordance with the approved shop drawings and at such time as approved when construction and finish of adjoining work will permit and in sufficient time to avoid delays to the construction process. All BME shall be secured in place as shown on drawings.

3.3 **FIELD QUALITY CONTROL**

A. Conduct full live load and operational tests, after completion of the installation, under maximum design live loading conditions over a selected range of the building surfaces, in accord with applicable standards.

B. At a time mutually agreeable to all parties, allow one (1) full day to conduct operational demonstrations for the Owner and/or the Owner's representative, after completion of the operational tests.

C. Repair or replace any components and correct all deficiencies observed as a result of these tests and demonstrations, and retest to assure compliance with the Contract Documents.

3.4 CERTIFICATION

A. Provide written Certificate of Compliance that all components have been successfully operated following the procedures as referred to in Paragraph 3.3.A, and will perform in accordance with the intent of this design.

DIVISION 12

FURNISHINGS

SECTION 122413

ROLLING WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 061000 - Rough Carpentry: Wood blocking.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data for rolling shades.
   2. Include data to indicate shading coefficient, and thermal transmittance/reflectance properties.

C. Shop Drawings:
   1. Submit shop drawings for rolling shades.
   2. Indicate typical layout including dimensions, and location of controls.
   3. Submit detail drawings of special accessory components not included in manufacturer's product data.
   4. Submit detail drawings of head and sill conditions for each type of opening and supporting structure, and conditions between adjacent shade units.

D. Samples:
   1. Submit 2 sets of shade material samples indicating manufacturer's full range of colors and fabrics for selection by Architect.
   2. Submit three 36 inch square samples of shade material in selected material, pattern, and color, indicating variations in color, weave, and texture.
   3. Submit three 6 inch samples of fascia aluminum material in specified [selected] color and finish indicating variation in color and finish.

E. Informational Submittals: Submit the following:
   1. Qualification Data: Installer's qualification data.
   2. Manufacturer's instructions.

F. Closeout Submittals:
   1. Submit under provisions of Section 017300.
   2. Operation and Maintenance Data: Submit manufacturer’s printed, recommended operation and maintenance data.
   3. Warranty: Submit specified warranty.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. Furnish shade units from one manufacturer for entire Project, unless otherwise acceptable to Architect.
   2. Provide each shade as complete unit, including hardware, mounting brackets, fasteners, and accessory items.

B. Installer's Qualifications: Acceptable to manufacturer.

C. Regulatory Requirements: Ensure fabrics and plastic components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke development indices.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

B. Deliver shades to site wrapped and packaged to prevent damage to components and marring of surfaces.

C. Store shades in clean, dry area, laid flat and off ground to prevent sagging, twisting, or warping.

D. Safeguard against damage by physical abuse or damage from harmful materials.

1.5 WARRANTY

A. Comply with provisions of Section 017800.

B. Warrant installed shade units to be free from defects in material and workmanship for a period of 3 years.

C. Warrant applied finishes to maintain gloss and resist peeling, fading, and chalking for a period of 3 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products:
   1. Castec Window Shading, Inc., North Hollywood, CA.: Rollstar Series - Manual Operation.
   2. Draper Shade and Screen Company, Inc., Spiceland, IN.:
      a. FlexShade System - Manual Operation.
      b. Lite-Lock System - Manual Operation.
   3. MechoShade Systems, Inc., Long Island City, NY.:
      a. Mecho Shade Series - Manual Operation.
   4. Sol-R-Veil, Bronx, NY.:
      a. Sure Shade Manual System.

2.2 MATERIALS AND COMPONENTS

A. Drive Roller Tube: Round tube with asymmetrical channels to receive shade spline; sized by manufacturer for height, width, and weight of fabric to prevent sag; extruded 6063 alloy, T6 temper aluminum.

B. Decorative Shade Fabric: As selected by Architect from samples submitted.

C. Light Filtering Shade Fabric: ASTM D3374; flame retardant, PVC coated, fiberglass/polyester yarn woven to create maximum 5 percent openness factor; color as selected by Architect from samples submitted.

D. Manual Drive Mechanism:
   1. Operator: Smooth operating chain and sprocket [or pole driven worm gear] drive with concealed, adjustable, bi-directional slip clutch that will allow shade to stop in any position.
   2. Limit Controls: Provide upper and lower stop limits to prevent over winding and to allow air flow at sill.

E. Fascia: Minimum 0.063 inch thick extruded aluminum, designed to conceal roller and operating mechanism with no exposed fasteners. Finish as selected by Architect.

F. Accessories:
   1. Bottom Bar: Minimum 1/8 by 3/4 inch aluminum bar sewn into bottom hem of shade.
   2. Mounting Brackets: Sheet steel brackets to receive drive end and idle end roller caps. Include hardware necessary to securely attach brackets to supporting construction and to support weight of shades plus forces applied to operate shades.
   3. Control chain: Continuous stainless steel bead chain.
   4. Provide other materials necessary for complete and proper installation and operation.

2.3 FABRICATION

A. Prior to fabrication, field measure actual opening dimensions to ensure proper fit.

B. Fabricate units for between mullion (inside) mounting to completely fill openings from head to sill and mullion to mullion.

C. Fabricate units for ceiling pocket mounting to completely fill openings from head to 1-3/4 inch below glass sight line at sill and from centerline to centerline of mullions. On single windows and at sides of end windows, allow for 1-3/4 inch overlap beyond glass sight line at jambs.
   1. Recessed Ceiling Pocket: Minimum 26 gage sheet steel or aluminum.

D. Fabricate shades in longest possible lengths. Locate ends of adjacent shade units at window mullions or other defined vertical separations where single length shades are not practical.

E. Fabricate roller tube with controls capable of being located at either end of tube.

F. Fabricate shade fabric with top edge attached to removable spline designed to lock into roller tube. Fabricate bottom edge with concealed bottom bar sewn in hem. Hem, heat-set or otherwise treat edges of fabric to prevent raveling.

G. Adjust limit controls to allow infinite positioning of shades from fully closed to fully open.

H. Locate operating controls on right end of each shade.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that openings in which shades will be installed are free of conditions that might interfere with shade installation or operation.

3.2 INSTALLATION

A. Install in accordance with Section 017300 and approved shop drawings.

B. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.

C. Install shades with adequate clearance to permit smooth operation of shades and sash operators.

D. Maintain 1/4 inch clearance from each side of window openings on inside mounting conditions and 1/4 inch between adjacent shade units unless other clearance is indicated on approved shop drawings.

3.3 ADJUSTING

A. Adjust parts for smooth, uniform operation.

B. Adjust preset limit stops as directed by Architect.

3.4 CLEANING

A. Wipe surfaces with clean damp cloth as recommended by manufacturer. Do not use steam, hot water, bleach, or abrasive or solvent based cleaners.

3.5 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Store installed shades in fully retracted position to avoid damage and accumulation of dust and dirt until Final Completion.

END OF SECTION

SECTION 129313

BICYCLE RACKS

PART 1 - GENERAL

1.1 SUMMARY

A. This Project is a US Green Building Council LEED project.
   1. Select materials to maximize use of recycled steel.
   2. Select locally or regionally fabricated products wherever possible.
   3. Comply with LEED requirements for alternative transportation;

1.2 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Shop Drawings: Submit for specially fabricated items. Indicate details necessary for complete fabrication and installation, including spacing and sizes of connections and members, finishes of members, and other necessary information.

C. Samples: Submit samples of finishes and colors of materials for selection by Architect.

D. LEED Data: Furnish special submittals conforming to Section 018113 - LEED Requirements for the following:
   1. LEED Credit MR Cost Data: Submit special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
      a. Bicycle Racks.
   2. LEED Credit MRc4: Furnish documentation certifying the percentage of pre-consumer and post–consumer recycled content of metal materials based on material cost per weight for the following materials:
      a. Bicycle Racks.
   3. LEED Credit MRc5: Furnish manufacturer name and location data for the following materials. Provide separate data for each different manufacturer used:
      a. Bicycle Racks.

1.3 COORDINATION

A. Coordinate with other sections of Specifications to ensure proper scheduling for delivery and installation of Work and to ensure that proper provisions are made for installation of work specified.

PART 2 - PRODUCTS

2.1 STEEL PIPE BICYCLE RACKS

A. Class III Definition: Light security, allows bicycle frame and both wheels to be secured by six-foot cable carried by cyclist. It also allows U-shaped lock to secure bicycle frame and one wheel to rack.

B. Inverted "U" Shape Rack.
   1. 1-1/2” Schedule 40 Pipe 1-1/2 inch I. D., rolled in the shape of an inverted “U” to 24 inch outside radius of standing 36 inches high.
   2. Finish: Stainless steel
   3. Texture-regular grain
   4. Tensile Strength-1800 PSI min.
   5. Resistance to abrasion
   6. Salt Spray Resistance to >2000 hours
   7. Hardness (Shore D) ASTMD 2240 – Results 52
   8. Installation Options: In-ground (G), [Surface-Mount (S)] [Rail-Mount (R)]
   9. Acceptable Products:
      a. U-2, Cycle-Safe, Inc.
      b. CycLoops, Columbia Cascade.
      c. Hoop Rack, Dero Bike Rack Co.

d. Challenger Plus CH3, Madrax.

C. Non-Shrink Grout:
1. Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives.
2. Minimum Compressive Strength at 28 Days: 5000 psi.
3. Acceptable Products:
a. Crystex, L&M Construction Chemicals, Omaha, NE.
b. Masterflow 713, Master Builders, Cleveland, OH.
c. Euco Rock Anchor Bolt Grout, Euclid Chemical Co., Cleveland, OH.
d. SikaGrout 212, Sika Corporation, Lyndhurst, NJ.
e. Five Star Grout, Five Star Products, Fairfield, CT.

2.2 FABRICATION

A. Fabricate units from continuous pipe without splices.

B. Bends:
1. Bend rails in jigs.
2. Do not damage or distort pipe and maintain cylindrical cross-section of pipe maintained throughout bend.
3. Form bends free from buckles and twists, with finished surfaces smooth.

C. Coat materials in contact with concrete with bituminous paint.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation.

B. Clean sleeves of debris.

3.2 INSTALLATION

A. Install in accordance with approved shop drawings.

B. Install bicycle racks at locations indicated on Drawings.

C. Install racks in straight line, plumb, and level.

D. Anchoring Units:
1. Securely anchor each unit in accordance with manufacturer's instructions.
2. Class II Units:
a. Anchor posts in preset sleeves anchored in concrete or drilled holes. Drill holes 1 inch greater than outside diameter of pipe post.
b. Fill annular space between posts and sleeves solid with non-shrink non-metallic grout.
c. Wipe off excess grout and leave 1/8 inch build-up sloped away from post.
3. Class III Units:
a. Anchor posts in preset sleeves anchored in concrete or drilled holes. Drill holes 1 inch greater than outside diameter of pipe post.
b. Fill annular space between posts and sleeves solid with non-shrink non-metallic grout.
4. Class III Units:
a. Secure to finish grade with manufacturer's recommendations using flange mounting system.
b. Include base cover flange.
c. Increase fastener length by 3 inches if mounting on brick pavers.
d. Coordinate with waterproofing to verify integrity of waterproofing system.

3.3 PROTECTION

A. Protect bicycle racks from damage and defacement until final acceptance. Replace damaged or defaced bicycle racks with new units prior to final acceptance.

END OF SECTION

DIVISION 13

SPECIAL CONSTRUCTION

SECTION 131120

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this Section. Principal items include:
   1. The Work under this section shall include all labor, materials and equipment required to complete the Concrete Work as indicated and specified.
   2. Materials and/or methods specified in this section as "I.B.C.", "I.B.C. Standards" or similar wording refer to the model building code developed by the International Code Council (ICC) and the International Building Code (IBC) Standards, 2009 Edition.
   3. Except as otherwise specified herein, the work of this Section shall be in accordance with Chapter 19A "Concrete", of the California Building Code, 2010 Edition.

B. Design Requirements:
   1. Provide stainless steel units at staff locker rooms.
   2. Determine specific locations and sizes for access doors and panels needed to gain access to concealed equipment, and indicate on schedule specified under “Submittals” Article.

1.2 QUALITY ASSURANCE

A. Reference Standards
   1. American Society for Testing and Materials (ASTM):
      a. C33 Standard Specification for Concrete Aggregate
      b. C150-85 Standard Specification for Portland Cement

1.3 SUBMITTALS

A. Conform to Division 1 requirements. Submit Shop Drawings for complete deck structure including complete detailed reinforcing bar bending and layout diagrams.

B. Concrete Mix Design: Submit a mix design for each strength and type of concrete. Furnish a complete list of materials including type, brand, source, and amount of cement, pozzolan, and admixtures. Submit applicable reference specifications, and copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Obtain approval before concrete placement.

C. Product Data: Submit manufacturer's printed data identifying concrete color admixture and cure sealer with technical data, and installation requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Standard Specification for Portland Cement.

B. Aggregate: ASTM C33, Standard Specification for Concrete Aggregate, well graded from fine to coarse. Certified Aggregate from a known source that is not expansive.

C. Water: Clean and potable.

D. Reinforcing Steel: ASTM A615, Grade 60, Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement. Size and spacing of bars as indicated on the drawings.

E. Xypex™: Waterproofing admix.

F. Curing Paper: A standard brand conforming to ASTM C 171, Type 1 – Regular, Kure-N-Seal.

2.2 TESTS AND INSPECTIONS

A. Samples and Tests of Concrete:
   1. Samples: ASTM C172, Standard Method of Sampling Fresh Concrete. Samples may be obtained by the molded cylinder method.

2. Molded Cylinder Tests: If the molded cylinder method is used, there shall be not less than one test for each 50 cubic yards of structural concrete for each grade of concrete used and there shall be at least one test for each day's placement for each grade of concrete use. Each cylinder shall be dated, given a number, the point in the structure from which the sample was taken, and the result of the accompanying slump test noted thereon. Cylinders shall represent as nearly as possible the batch of concrete from which they were taken.
3. Defective Concrete: Should the strength of any grade of concrete for any portion of the work indicated by tests of molded cylinders fall below the minimum 28 day strengths specified or indicated, Structural Engineer will require core specimens to be cut from designated locations. If the compressive tests of the core specimens fail to show the required compressive strength, the concrete will be deemed to be defective and shall be replaced or adequately strengthened in a manner acceptable to the Owner and the Architect/Engineer. The Contractor shall bear all costs incurred in connection with said tests, replacement and strengthening.
4. Plant Inspection and Certification: Continuous inspection shall be maintained at the batch plant and for transit-mixed concrete to run check sieve analysis of aggregate, check moisture content of fine aggregate, check the design of the mix, check the cement being used with the test reports, check the loading of the mixer trucks, and certify to the quantities of materials placed in each mixer truck. Inspection shall be made by a representative of a Testing Laboratory selected by the Owner. The Owner will pay for inspection costs. With each mixer truck, the manufacturer of the ready-mixed concrete shall deliver to the Owner's Inspector a certificate with each mixer truck. The certificate shall bear the signature of the representative of the Testing Laboratory, and shall state the quantity of cement, water, fine and coarse aggregate, and admixture, if any, contained in the load.

2.3 CONCRETE MIXES

A. Strength of Concrete: All concrete shall be as indicated on the drawings as 4500 psi Minimum.

B. Slump Requirements:

	Slump, Inches	
Element	Minimum	Maximum
Footings and Foundations	2	4
Slabs and Decking	2	3

C. Shrinkage Tests:
1. Prior to placing any concrete for walls or horizontal surfaces, a trial batch of each mix design of structural concrete shall be prepared using the aggregates, cement and admixture (if any) proposed for the project. From each trial batch at least 3 specimens for determining drying shrinkage shall be prepared. The drying shrinkage specimens shall be a 4" x 4" x 11" prisms fabricated, cured, dried, and measured in accordance with the requirements of Tentative Method of Test for Length Change of Cement Mortar and Concrete, ASTM C157. The measurements shall be made and reported separately for 7 and 28 days of drying after 7 days of moist curing. The effective gage length of the specimens shall be 10", and except for the foundation concrete, the average drying shrinkage at 35 days shall not exceed .054%.
2. Previous Test: Ready-mixed concrete manufacturer may furnish certified test reports from approved Testing Laboratory as proof of meeting shrinkage requirements, provided aggregate used and concrete covered by such test report conform to mix design approved for use on this project. Method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs.

D. Ready-Mix Concrete
1. Comply with ASTM C 94/C 94M.
2. Before using trucks for batching, mixing, and transporting concrete, thoroughly clean trucks and equipment of materials capable of contaminating concrete.
3. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 is required.

4. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 90 minutes to 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.
5. Do not add water to ready-mix concrete at Project site except when slump is below specified limits and total water does not exceed the design water-cement ratio; inject added water into mixer and mix thoroughly before discharging.

E. Provide certificate signed by authorized official of supplier with each load of concrete stating following:
1. Time truck left plant.
2. Mix of concrete, identify with code number of mix design.
3. Amount of water and cement in mix.
4. Amount and type of admixtures.
5. Amount of water added at project site.
6. Time truck is unloaded at project site.

F. Truck mixers without batch tickets will be rejected.

G. Retain certificates at Project site. Submit to Architect for review upon request.

2.4 FORMS FOR CONCRETE

A. Forming Materials: Materials shall be new. Materials may be reused during the progress of the work provided they are completely cleaned and reconditioned, recoated for each reuse, capable of producing formwork of the required quality and are structurally sound.
1. Footings and Foundations: Douglas Fir "Standard" or better boards, wood or steel stakes, substantially constructed to the shape indicated and to support dowels and screeds for the wall forms.
2. Wall Forms: 3/4" minimum, Douglas Fir plywood, Grade B-B, Class I or II, Exterior, sanded both sides conforming to U.S. Product Standard 1-83. Plywood shall be edge-sealed and oiled both sides with colorless form oil.

B. Construction of Forms:
1. General: Forms shall result in a final structure which conforms to shape, lines and dimensions of members as required by the drawings and specifications, and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape. Forms and their supports shall be designed so that previously placed structures will not be damaged. Forms shall be true to line within 1/250 of the span.

PART 3 - EXECUTION

3.1 REINFORCING

A. General: Fabrication and placement of reinforcing for concrete construction shall be in accordance with the requirements of Title 24, Part 2, California Administrative Code, with U.B.C. and as shown.

B. Accurately position and secure reinforcing in place as indicated and specified. Secure reinforcing so that it will not be displaced while placing concrete.

C. Reinforcing shall be checked before concrete is placed and cleaned again if required.

3.2 CONCRETE

A. Time of Placing: Do not place concrete until reinforcement, conduits, outlet boxes, anchors, hangers, sleeves, bolts, and other embedded items and materials are securely and properly fastened in the proper positions. Reinforcement and forms shall be inspected and approved by the Owner 24 hours before concrete is placed.

B. Conveying: Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials. Concrete shall not be handled nor pumped using aluminum equipment. Install plumb, level, square and rigidly secured in accordance with Section 017300.

C. Placing Concrete:

1. Concrete shall be placed only under the direct supervision of the Owner's Inspector. Do not place concrete outside of regular working hours, unless the Owner's Inspector has been notified at least 24 hours in advance and is present. No concrete that has partially hardened or been contaminated by foreign materials shall be deposited in the forms, nor shall re-tempered concrete or concrete which has been remixed after initial set be used.
2. Concrete shall be thoroughly consolidated by suitable means during placement, and shall be thoroughly worked around the reinforcement and embedded fixtures and into the corners.

D. Finish of Concrete:
1. Floors and slabs: Smooth steel trowel.
    a. Apply the hardener after the surface of the concrete has reached the point where no excess moisture shows, but is still plastic. Apply at the rate of 20 pounds per 100 square feet of surface for the initial application.
    b. Protection and Curing: All concrete floors shall be cured and protected with concrete curing paper.
2. Concrete wall surfaces that are to be left exposed shall be smooth and free from form marks. Fins and surface irregularities

E. Curing of Concrete: Concrete shall be maintained above 50 F, and in a moist condition for at least the first 7 days after placing.

END OF SECTION

SECTION 131122

SHOTCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this Section. Principal items include:
   1. Shotcrete for swimming pool structure.
   2. Preparation of surfaces to receive shotcrete.
   3. Forms and ground wires.
   4. Furnishing and placing reinforcing steel for shotcrete.
   5. Mixing, delivery, placing, finishing, and curing of shotcrete.
   6. Protection and cleaning of adjacent surfaces.

B. Related Work Not in this Section:
   1. Mass excavation and related earthwork for swimming pool.
   2. Cast-in-place concrete.
   3. Swimming pool plaster and tile finish.

1.2 QUALITY ASSURANCE

A. Qualifications of Shotcrete Subcontractor: Proposed Subcontractor must have at least 5 years experience in structural shotcrete construction and have constructed at least 20 significant structural shotcrete swimming pools which, on investigation, have been found to be completed in a satisfactory manner.

B. Qualifications of Mechanics: Employ only skilled nozzlemen, nozzleman's helpers, and rodmen having at least three years of structural shotcrete placing experience and furnish written evidence of such experience upon request. Each team, consisting of the nozzleman and the helper, shall shoot a test panel of the thickness and with typical reinforcing steel pattern using each shotcreting position before commencing any wet mix shotcreting work on the pool. The Special Inspector shall witness the assembly, reinforcing, shooting and disassembly of the test. The panel shall be at least 4 feet by 4 feet. After shooting, but before the concrete has fully set, the panel shall be disassembled to assure that the team and the equipment to be used is capable of providing sound concrete behind the reinforcing steel.

C. Reference Standards: Except as modified by the requirements of the Contract Documents, Shotcrete Work shall conform to all requirements of ACI 506-66.

D. Inspection: Continuous Inspection by a Special Inspector is required during slump tests, placement of shotcrete and taking of cores. The Special Inspector shall be interviewed and approved by the Owner prior to inspecting the work at the job site. Note that one Special Inspector shall be required for each nozzle team.

1.3 SUBMITTALS

A. Shotcrete Mix Design: Submit a mix design for each strength and type of shotcrete. Furnish a complete list of materials including type, brand, source, and amount of cement, pozzolan, and admixtures. Submit applicable reference specifications, and copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Obtain approval before concrete placement. Any shotcrete work placed prior to approval of the shotcrete mix design is not acceptable, is rejected and shall be removed at no cost to the Owner.

B. The Contractor shall provide the Owner and the Structural Engineer a written procedure for placing of shotcrete prior to commencement of work.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Form lumber: WCLIB "Construction" grade or better, WWPA No. 1 or better, or equal.

B. Form plywood: PS 1-83, Group I, Exterior Grade B-B Plyform or better, minimum 5-ply and 5/8" thickness, grade marked, not mill oiled. Plywood having medium or high density overlay is acceptable.

C. Form ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, or equal, not leaving metal within 2" of concrete surface.

D. Form coating: Resin type coating free of oil, silicone, wax, and non-drying material, not grain raising.

2.2 REINFORCING STEEL

A. Reinforcing bars: ASTM A615, Grade 60.

B. Reinforcing mesh: ASTM A185, Mesh size and gage as show, 60-ksi minimum tensile strength.

C. Tie wire: Annealed copper-bearing steel, 16-gage minimum.

D. Welding electrodes: AWS D1.4, Table 5.1, low hydrogen electrodes, E9018 for Grade 60 steel.

2.3 SHOTCRETE MATERIALS

A. Portland Cement: ASTM C150, Type II, low alkali, no fly ash.

B. Fine aggregate: ACI 506 Gradation No. 1 or 2, ASTM C33, washed hard dense durable clean sharp sand from approved pit, free of organic matter and opaline, feldspar, or siliceous magnesium substances and containing not more than 3% by weight of deleterious substances. When tested for organic impurities by ASTM C40 method, fine aggregate color not darker than reference standard color. When tested for soundness by ASTM C88 method, loss after 5 cycles not over 10% of fine aggregate.

C. Water: Potable, fresh and maintained at uniform pressure not less than 15 psi above air pressure at the nozzle.

D. Xypex™: Waterproofing admix.

E. Curing Paper: A standard brand conforming to ASTM C 171, Type 1 – Regular, Kure-N-Seal.

2.4 EPOXY CRACK REPAIR SYSTEM

A. Sika Corporation "Sikadur 35 Hi-Mod" with "Sikadur 31" for sealing cracks. Install with a positive displacement piston driven pump injection system by a certified installer. Installer shall have satisfactorily preformed the proportioning, mixing and dispensing of the specified product for a minimum of 10 years.

2.5 FABRICATION

A. Reinforcing Bars: Fabricate bars of approved sizes. Bend and form to required shapes and lengths using methods not injurious to bars. Do not heat bars for bending. Bars with unscheduled kinks or bends are subject to rejection.

1. Welding: Perform welding, where shown or approved, by the direct electric arc process in accordance with AWS D1.4 using specified low-hydrogen electrodes. Preheat 6" each side of the joint. Protect joints from drafts during the cooling process; accelerated cooling is prohibited. Do not tack weld bars. Clean metal surfaces to be welded of all loose scale and foreign material. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, the complete welds must exhibit uniform section; smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds found defective with chisel and replace with proper welding. Employ only experienced certified welding operators. Reinforcing bars to be welded shall have a maximum 0.75 carbon equivalent.
2. Marking and Shipping: Bundle bars, tag with identification, and transport and store so as not to damage any material. Keep a sufficient supply of tested and approved bars at site to avoid delays.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

A. Clean and roughen cast-in-place concrete work to receive shotcrete by sandblasting or mechanical roughening and, just prior to placing of shotcrete, clean off debris, dirt, and dust. Compact earth surfaces to receive shotcrete by bringing to optimum moisture content and compacting with pneumatic tampers or other suitable equipment to at least 95% of the maximum dry density. If sloughing or caving of earth banks occurs, fill the resulting voids with shotcrete at no extra cost to Owner; backfilling such voids with earth is not allowed. Dampen concrete and earth surfaces before shotcrete is deposited, but not so wet as to overcome suction.

3.2 PROTECTION

A. Protect all surfaces not receiving shotcrete with waterproof paper or other means. Repair damage as approved, at no extra cost to Owner.

3.3 FORMS

A. Erect rigid forms that produce smooth plane surfaces, of plywood, steel, or equal, built and erected to permit escape of air and rebound.

B. Ground Wires: Place ground wires for use as screeds to set thickness, surface planes, and form of shotcrete. Place ground wires tight and true to line and in such manner that they are easily tightened.

C. Embedded Piping, Boxes, and Rough Hardware: Coordinate with trades that are to fasten or install in shotcrete piping, boxes, bolts, anchors, inserts, or other rough hardware and accurately set such items in forms of shotcrete, and be responsible for changes in the position of such items after setting.

3.4 REINFORCING INSTALLATION

A. Provide additional reinforcing bars at openings as required. Before placing bars, and again before shotcrete is placed, clean bars of loose mill scale, oil, or any other coating that might destroy or reduce the integrity of the bond.

B. Securing in Place: Accurately place bars and wire tie in precise position at each and every bars crossing, in a manner which shall prevent any movement of the reinforcing during placement of the shotcrete mix. Bend ends of wire ties away from shotcrete surface. Support bars according to the current edition of "Recommended Practice for Placing Bar Supports" of Concrete Reinforcing Steel Institute using approved accessories and chairs. Place precast concrete cubes with embedded wire ties to support bars in shotcrete placed on earth. Maintain minimum two-inch clear distance between reinforcing bars and shotcrete surface on pool interior, and minimum three-inch clear distance between reinforcing bars and shotcrete surface on earth side, unless otherwise indicated or directed.

C. Splices: Do not splice reinforcing bars at the points of maximum stress except where indicated. Lap splices as shown or required to develop the full strength or stress of bars. Stagger splices in bars at least 48" in alternate bars. Contact splices may be made in bars which are #5 and smaller. Lap splices shall be 30 bar diameters unless noted otherwise.

D. Field Welding of Bars: As specified for fabrication.

E. Maintaining Bars In Position: Assign a competent ironworker mechanic at every shotcrete placing location to inspect reinforcement and maintain all bars in correct positions.

3.5 SHOTCRETE QUALITY

A. Accurately control proportion of water to portland cement to produce thorough and uniform hydration of the shotcrete that, when shot, forms a homogeneous mass containing neither sags nor dry sand formation.
   1. Strength: Minimum 4,500 psi 28-day compressive strength unless otherwise indicated.
   2. Slump: The slump measured at the point of discharge from the mixer shall be minimum 1-1/2 inches and maximum 2-1/2 inches.

B. Discontinue shotcrete work if the time between the addition of mixing water to cement and aggregate, or cement to aggregates, and placement of shotcrete exceeds 90 minutes when the ambient temperature is below 85°F, or exceeds 60 minutes when the ambient temperature is above 85°F.

3.6 SHOTCRETE PLACING, FINISHING, AND CURING

A. Operations: Use minimum 45 psi air pressure for hoses up to 100 feet in length; increase the air pressure 5 psi for each additional 50 feet or fraction thereof. In addition, increase the air pressure 5 psi for every 25 feet of hose vertical rise or fraction thereof. Use maximum 1-5/8 inch size nozzle.
   1. Inspection: One Special Inspector shall be assigned to each nozzle.

B. Placing: Except when enclosing reinforcing, hold the nozzle perpendicular to and 2-1/2 to 3 feet from surface. At reinforcing bars, hold the nozzle so as to direct shotcrete around and behind the bars, and shoot each side of each bar separately. A second experienced man equipped with an air jet shall attend the nozzleman whenever reinforcing steel is being encased and shall carefully precede the nozzle and blow out all rebound and sand which may be lodged behind the steel, on forms, or placed shotcrete. Additional workers may be required to take the rebound from the work, if the air blowpipe cannot remove the rebound. Placing shotcrete horizontal members from the top is not allowed unless approved methods are employed to eliminate all rebound. Material shall emerge from the nozzle in a uniform flow. If flow becomes intermittent for any reason, direct the nozzle away from the surface until the flow is again steady and constant. Do not reuse rebound or loose sand for any purpose.

C. Puddled Shotcrete: Use of "puddled shotcrete" in which the air pressure is reduced and the water content is increased to facilitate placing in difficult locations is not allowed. Do not place shotcrete where nozzle stream cannot impinge directly on the involved surface. Where difficult shooting conditions occur, obtain proper results by maintaining correct air pressure and water ratio and reduce supply of material.

D. Construction Joints: Form joints with sloping beveled edges. Clean and dampen the hardened joint surfaces before placing additional shotcrete. Square edged construction joints are not allowed. No keyways or embedments shall be placed on the front face, which will interfere with the nozzle stream.

E. Finishing: Rod exposed surfaces to true planes and lines on reaching the thickness and plane established by forms and ground wires. Tamp and wood float surfaces level and provide a rough raked finish.

F. Curing: Keep shotcrete continuously damp for not less than 7 days after placing. Use sealed curing sheeting or other approved curing method where water curing is not feasible. Do not use curing compound of any kind.

G. Testing: Testing shall consist of 4 inch or larger diameter cores cut from the full depth of the wall, with a minimum of one core for each 1,000 square feet of wall and a minimum of two cores for each day’s application by any nozzle team. The cores shall be tested according to ASTM C42, tested in the condition in which they were removed. Cores shall be taken and tested at 28 days.

3.7 CRACK REPAIR

A. Repair all cracks in shotcrete, or between shotcrete and concrete. Cut cracks out 6 inches wide, slope bevel and dampen the cut edges. Repair with new shotcrete cured and finished to match the adjoining surface. In lieu thereof and subject to prior approval in each case, cracks may be repaired by epoxy pressure grouting system using epoxy crack sealer, nipples, and pressure epoxy injection; conform to epoxy system manufacturer's instructions. Remove nipples and fittings and fill the holes with epoxy. Finish repairs flush with the adjoining surface. Delay crack repair as long as possible and perform just prior to application of plaster finish.

3.8 FIELD QUALITY CONTROL

A. Refer to Division 1 regarding quality control.

B. Inspection: Construct structural shotcrete under continuous inspection of a Special Inspector. The Contractor agrees to provide a designated liaison between his crew, the Special Inspector and the Owner. Obtain inspection and approval of forms and reinforcing by the Building Department as required by the Inspector before placing structural shotcrete.

C. Compressive Strength Tests:
   1. Required Compressive Strengths: Minimum compressive strength of 2,000 psi for 7 day cylinder and 4,500 psi for 28 day cylinder.

2. Core Tests: Testing Laboratory shall take three cores for each 5,000 square feet of structural shotcrete, or fraction thereof, using procedures conforming to ASTM C42, one core taken at shotcrete age of 7 days, the other two cores at 28 day age. Cores shall be taken from 3-foot square test panels with thickness and reinforcing typical of the area of work in place. Core test compressive strengths shall meet the specified strength requirements. If any 28 day core from the test panels shows deficient strength, additional cores shall be taken and tested at Contractor's expense from the area of work in place represented by the test panel; two additional cores are required for each deficient core. If any additional test core proves deficient, Contractor shall remove and replace deficient shotcrete as directed and approved, at no extra cost to Owner. Should deficiency be evident in 7-day cores, Contractor may proceed with the Work on his responsibility and risk until the 28-day cores are tested.

D. Defective Shotcrete: Cut out and replace defective shotcrete including rebound, sand pockets, sags, sloughing, and other defects at no extra cost to the Owner

END OF SECTION

SECTION 131125

SWIMMING POOL CEMENTITIOUS WATERPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this Section. Principal items include:
   1. Swimming pool gutter waterproof finish.

1.2 PRODUCT DELIVERY AND STORAGE

A. Deliver manufactured materials to site in manufacturers' original unbroken packages or containers bearing manufacturers' name and brand labels. Keep urethane materials dry until ready to be used and stored off the ground, under cover, and away from damp surfaces.

1.3 JOB CONDITIONS

A. Apply waterproofing in exterior swimming pool only when ambient temperature is above 60°F and below 90°F, and protect applied coating from rapid drying by sun or wind until curing is completed. Do not apply or mix the coating in direct sunlight or when the ambient temperature is rising.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Waterproof Coating: "CIM 1061" polyurethane based waterproof coating for concrete, as manufactured by CIM Industries Inc, or approved equal.

B. Primer: "CIM 61BG" epoxy primer, as manufactured by CIM Industries Inc, or approved equal.

2.2 PROPORTIONS AND MIXING

A. Materials are specified on a volume basis and shall be measured in approved containers that will insure that the specified proportions will be controlled and accurately maintained during the progress of the work. Measuring materials with shovels ("shovel count") is not permitted.

B. Waterproof Coating: Mix one gallon of premix with appropriate amount of activator specified on the container.

C. Mixing: Perform mixing in approved mechanical mixers of the type in which quantity of water can be controlled accurately and uniformly. Mix to the manufacturer’s recommendations for swimming pool applications. Discard material which has begun to set before it is used; re-tempering is not allowed. Do not use any caked or lumpy materials. Completely empty mixer and mixing boxes after each batch is mixed and keep free of old material. If material is too viscous, do not thin with water.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

A. Existing surface to be coated must be smooth and clean. Sandblast entire surface to remove projections, loose particles, foreign matter, and make sufficiently rough to provide a strong mechanical bond. Chip, sandblast, or grind off all defective materials and foreign matter. Repair all cracks with "Waterplug" concrete patch, or approved equal. All areas of loose plaster discovered shall be completely removed down to rough concrete. Prior to coating, thoroughly wash entire surface with 5,000-psi high-pressure water. Do not apply coating to base surfaces containing frost. Install temporary coverings as required to protect adjoining surfaces from staining or damage by waterproofing operations.

3.2 APPLICATION OF WATERPROOFING

A. General: Apply waterproof coating to minimum 120 mil thickness at any location. Apply finish coating by hand with tampico fiber brush (do not use a paint brush).

B. Workmanship: Apply waterproof coating in four coats with each additional coat applied one to four hours after the previous application or when previous application has solidified. Do not dampen surface immediately ahead of application. Brush on four coats of waterproof coating, each with a minimum of 30 mil thickness, for a total of 120 mil thickness in all areas. Form coating carefully around curves and angles. Where horizontal surfaces meet vertical surfaces, apply cant strips in conjunction with trowel grade cartridges.

C. Curing: Waterproof coating needs to harden without a rise in ambient temperature or direct exposure to sunlight. Do not allow any contact with cant strips or waterproofing for a minimum of 12 hours.

D. Patching and Cleaning Up: Upon completion, cut out and patch loose, cracked, damaged, or defective waterproof coating; patches matching existing coating in texture, color, and finish, flush with adjoining coating. Remove waterproof coating droppings or spattering from all surfaces. Leave surfaces in clean, unblemished condition ready for pool filling. Remove protective coverings from adjoining surfaces. Remove rubbish and debris from the site.

END OF SECTION

SECTION 131130

SEALANTS AND CAULKING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this Section. Principal items include:
   1. Labor, materials, and equipment to complete Sealants and Caulking as indicated and specified.

1.2 QUALITY ASSURANCE

A. Reference Standard:
   1. American Society for Testing Materials (ASTM):
      a. C920-79 Elastomeric Joint Sealants

1.3 SUBMITTALS

A. Certificates of Conformance or Compliance: Submit certificates from the manufacturers attesting that materials meet the specified requirements.

B. Manufacturers' Descriptive Data: Submit complete descriptive literature for each type of material. Clearly mark data to indicate which type the Contractor intends to provide. Data shall state conformance to specified requirements. Data for sealant and caulking shall include application instructions, shelf life, mixing instructions for multi-component sealants, and recommended cleaning solvents.

C. Colors: Submit one sample of each color for each sealant and caulking type to verify that products match the colors indicated. Where colors are not indicated, submit not less than five different samples of manufacturer's standard colors for selection by the Owner’s Representative.

1.4 SAMPLE JOINTS

A. Before Sealant and Caulking Work is started, provide a sample of each type of finished joint where directed. The sample shall show the workmanship, bond, and color of sealant or caulking. The workmanship, bond, and color of Work throughout the project shall match that of the approved sample joints.

1.5 ENVIRONMENTAL CONDITIONS

A. The ambient temperature shall be within the limits of 40 and 100 degrees F when the sealant and caulking are applied, unless noted otherwise herein.

1.6 DELIVERY AND STORAGE

A. Materials shall be delivered to the job site in the manufacturer's original shipping containers with brand names, date of manufacture, color, and material designation clearly marked thereon. Containers of elastomeric sealant shall be labeled as to type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 100 degrees F or less than 40 degrees F.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Products shall conform to the reference documents listed for each use. Color of sealant shall match adjacent surface color unless specified otherwise. For ASTM C920 sealants, use a sealant that has been tested on the types of substrate to which it shall be applied.
   1. Interior Sealant: ASTM C920, Type S or M, Grade NS, Class 12.5, Use NT. Color of sealant shall be as selected.
   2. Exterior Sealant: For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Class 25, Use T. Color of sealant shall be as selected.

3. Floor Joint Sealant: ASTM C920, Type S or M, Grade P, Class 25, Use T. Color of sealant shall be as selected.
4. Primer for Sealant: Use a non-staining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.
5. Bond Breakers: Use the type and consistency recommended by the sealant manufacturer for the particular application.
6. Backstops: Use glass fiber roving or neoprene, butyl, polyurethane, or polyethlene foams free from oil or other staining elements as recommended by the sealant manufacturer. Backstop material shall be compatible with the sealant. Do not use oakum and other types of absorptive materials as backstops.

2.2 POOL DECK EXPANSION JOINT SEALANT

A. Manufacturer: Sonneborn "SL2" 2-component chemically cured urethane sealant, color as selected by Owner’s representative.

B. Manufacturer: Sika Corporation “Sikaflex 2C SL” 2-component chemically cured urethane sealant, color as selected by Owner’s representative.

C. Manufacturer: “DECK O SEAL” gun grade 2-part joint sealant 2-part polysulfide 2-component chemically cured polysulfide rubber, color as selected by Owner’s representative.

2.3 POOL DECK EXPANSION JOINT BACKER

A. #16 silica sand

2.4 POOL EXPANSION JOINT SEALANT

A. Manufacturer: Sonneborn "Two Part Polysulfide" 2-component chemically cured polysulfide rubber, color as selected by Owner’s representative.

2.5 BACKER ROD

A. Manufacturer: Sonneborn Sonolastic closed cell backer rod, or approved equal.

B. Closed-cell backer-rod shall be resilient polyethylene foam designed for cold-applied joint sealants. Sealants do not adhere to closed-cell backer rod, which becomes an integral part of the joint sealing system. Used as a back-up material, closed-cell backer rod provides the proper shaping of the sealant while permitting it to stretch and recover with joint movement. Closed-cell backer rod is extruded to various diameters to accommodate a range of joint widths.

PART 3 - EXECUTION

3.1 GENERAL SURFACE PREPARATION

A. Surfaces shall be clean, dry to the touch, and free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Where adequate grooves have not been provided, clean out grooves to a depth of 1/2 inch and grind to a minimum width of 1/4 inch without damage to the adjoining Work.

3.2 SEALANT PREPARATION

A. Do not modify the sealant by addition of liquids, solvents, or powders. Mix multi-component elastomeric sealants in accordance with manufacturer's printed instructions.

3.3 GENERAL APPLICATION

A. Backstops: Where joint cavities are constructed deeper than indicated, tightly pack the back or bottom with backstop material to provide a joint of the depth indicated. Install backstops dry and free of tears or holes.

B. Primer: Just prior to application of sealant, clean out loose particles from joints. Apply primer in accordance with sealant manufacturer's directions. Do not apply primer to exposed finish surfaces.

C. Bond Breaker: Provide bond breakers as recommended by the sealant manufacturer for each type of joint and sealant used.

D. Sealant: Use a sealant that is compatible with the material to and against which it is applied. Do not use a sealant that has exceeded its shelf life or has become too jelled to be discharged in a continuous flow from the gun. Apply sealant in accordance with the manufacturer's printed instructions. Force sealant into joints with sufficient pressure to fill the joints solidly. Sealant shall be uniformly smooth and free of wrinkles.
   1. Interior Sealant: Provide sealant at all exposed joints and at all joints indicated to receive sealant.
   2. Exterior Sealant: Provide sealant at all joints around the perimeter of openings and at all exposed joints and at all joints indicated to receive sealant.
   3. Floor Joint Sealant: Provide sealant in all control joints and in other floor joints indicated or specified.

3.4 POOL DECK EXPANSION JOINT SEALANT

A. Joint Preparation
   1. The number of joints and joint width should be designed for a maximum of ±25% movement. The depth of the sealant should be 1/2 the width of the joint with a maximum depth of 1/2" (12.7 mm) and a minimum of 1/4" (6.35 mm).
   2. In joints of 1/4" to 1/2" (6.4 - 12.7 mm), the sealant depth at midpoint should be 1/4" (6.4 mm). In joints of 1/2" to 1" (12.7 - 25.4 mm), the depth at midpoint should be 1/4" to 1/2" (6.4 to 12.7 mm).
   3. Control the sealant depth in deep joints with closed-cell backer rod or soft backer-rod. Where the joint depth does not permit the use of backer rod, a bond breaker (polyethylene strip) must be used to prevent three-point bonding.
   4. To maintain the recommended sealant depth, install backer rod by compressing and rolling it into the joint channel without stretching it lengthwise. Backer rod should be about 1/8" larger in diameter than the width of the joint to allow for compression. Backer rod becomes an integral part of the joint. The sealant does not adhere to it, and no separation bond breaker is required. Do not prime or puncture the backer rod.

B. Surface Preparation
   1. Remove any old joint sealing material by mechanical means. If joint surfaces have absorbed oils, sufficient concrete must be removed to ensure a clean surface.
   2. Joint surfaces must be structurally sound, dry, clean, and free of all loose aggregate, laitance, oil, grease, asphalt, paint, wax, mastic compounds, waterproofing compounds, or form release materials.

C. Priming
   1. Prime Joint surfaces with manufacturer's recommended primer for the substrate before sealing. If the surfaces are other than shotcrete or concrete, test first to determine adhesion. Seek technical assistance from manufacturer.
   2. Apply primer in a thin uniform film. Avoid buildup of film.
   3. Allow approximate 30 minutes drying time before applying sealant.
   4. Reapply primer if not sealed the same day.
   5. To minimize contamination of adjacent surfaces, apply masking tape and remove before sealant has begun to thicken and set.
   6. Coverage rate of primers is approximately 35 square feet per pint.

D. Mixing
   1. Two two-component systems must be thoroughly mixed before use. The oversize Part-A container allows for the addition and mixing of Part-B and the color pigment.
   2. 1-1/3 gallon (5.67 L) unit: (1) Transfer Part-B to Part-A container using a spatula or knife. It is imperative that the entire contents of Part-B be combined with Part-A. (2) With a slow speed drill and a slotted mixing paddle, thoroughly mix for 3 minutes. The paddle blade must be kept below the sealants surface to avoid whipping in air. (3) Transfer the contents of the pigment can into the mixed Part-A and Part-B. Use a spatula or knife, removing the entire con tents to ensure consistent color. (4) Continue mixing with a slow speed drill and slotted paddle until color is uniform. During the process, the sides and bottom of the base can and the paddle itself several times.

3. 3.0 gallon (11.37 L) unit: Use 2 Part-B and 2 pigment container for each Part-A container. Mix as instructed under 1-1/2 gallon (5.69 L) unit.
4. Pot life of the sealant is dependent upon temperature.

E. Application
1. All caulking and sealing be should be performed when temperatures are above 40°F (+4°C) any moisture or frost on surfaces shall adversely affect adhesion.
2. Ideally, the temperature at the times of application should be the median of temperature extremes when the joint width opening is at its midpoint.
3. Fill joints from the bottom; avoid bridging of the joint that might form air voids.
4. For large joints, the self-leveling grade may be poured directly from the can.
5. For smaller joints and for all slope-grade applications, fill the joint by flowing the sealant from a bulk-loading gun.
6. Light tooling of the sealant is recommended to smooth out ripples. On sloped surfaces, tool from lowest point to highest.

F. Clean Up
1. Immediately after use and before sealant has cured clean equipment with xylene.

G. Curing
1. The cured sealant may be removed by cutting with a sharp-edged tool and thin films by abrading.
2. Protect joint from dirt and traffic overnight. Time for initial cure will vary with humidity and temperature.

3.5 BACKER ROD

A. Installation
1. Closed-cell backer rod must be compressed in the joint at the time of installation. For joint widths up to 3/4” (19.1 mm), the diameter of the rod should be 1/8” (3.18 mm) larger than the width of the joint. For 3/4” (19.1 mm) wide joints use 1” (25.4 mm) diameter rod.
2. Closed-cell backer rod may be easily installed with a blunt probe or a plain-faced roller to force the rod to the desired depth. A template or roller gauge may be used to control the depth at which the rod is placed. Do not puncture, fold, or crease backer-rod. Follow sealant manufacturer’s suggestions for joint sealant width and depth ratio.

3.6 POOL EXPANSION JOINT SEALANT

A. Joint Preparation
1. The number of joints and joint width should be designed for a maximum of ±25% movement.
2. In joints of 1/4” to 1/2” (6.4 - 12.7 mm), the sealant depth at midpoint should be 1/4” (6.4 mm). In joints of 1/2” to 1” (12.7 - 25.4 mm), the depth at midpoint should be 1/4” to 1/2” (6.4 to 12.7 mm).
3. Control the depth of deep joints with closed-cell backer rod or soft backer rod. Where the joint depth does not permit the use of backer rod, a bond breaker (polyethylene strip) must be used to prevent three-point bonding.
4. To maintain the recommended sealant depth, install backer rod by compressing and rolling it into the joint channel without stretching it lengthwise. Closed-cell backer rod should be about 1/8” larger in diameter than the width of the joint to allow for compression. Soft backer rod should be approximately 25% larger in diameter than the joint width. Backer rod becomes an integral part of the joint. The sealant does not adhere to it, and no separation bond breaker is required. Do not prime or puncture the backer rod.

B. Surface Preparation
1. Surface to receive sealant must be structurally sound, dry, clean, free of dirt, moisture, loose particles, oil, grease, asphalt, tar, paint, wax, rust, waterproofing, curing, and parting compounds, membrane material, and other contaminants.

C. Priming
1. Priming is required for all substrates
2. Full strength primers are applied with a brush on shotcrete/concrete, or clean cloth for metal or glass. A light uniform coating is sufficient for most surfaces; somewhat heavier but not excessive coat.

3. Depending on temperature and humidity, primer shall be tack-free in 15-30 minutes and ready for sealant. Priming and sealing must be done on the same workday.
4. Some primers may slightly darken light-colored shotcrete and concrete. Where appearance is important, prevent excess material from being applied outside of joints.

D. Mixing
1. The two-part polysulfide is a two-component system and must be thoroughly mixed before use. Do not open containers until ready for use. The oversize Part-A container allows for the addition and mixing of Part-B and the color pigment.
2. Transfer the Part-B to the Part-A container using a spatula or knife. It is imperative that the entire contents of Part-B be mixed thoroughly with the entire contents of Part-A.
3. With a slow speed drill and a slotted mixing paddle, mix Part-B and Part-A 4 to 6 minutes. The paddle blade must be kept below the sealants surface to avoid whipping air into the sealant.
4. Transfer the entire contents of the pigment can into the mixed Part-A and Part-B. Scrape out entire contents of color package with a spatula or knife to ensure consistent color. Continue mixing with a slow speed drill and slotted paddle until color is uniform. During the process, the sides and bottom of the base container and the paddle itself must be scraped several times.
5. The pot life of mixed two-part polysulfide is about 6 hours at 65°F (18°C) and 1 hour at 95°F (35°C).

E. Application
1. Two-part polysulfide is applied by professional bulk caulking gun loaded at the job site. Joints should be filled from bottom to top by holding a properly sized nozzle against the bottom of the joint.
2. Best results are obtained if the sealant is applied when the joint is at the midpoint of its designed expansion-contraction range, providing for optimum sealant efficiency with subsequent joint movement.
3. Field experience recommends that the caulking and sealing be performed when temperatures are above 40°F (+4°C) to avoid application to damp surfaces. Moisture will adversely affect adhesion.
4. Application may proceed as low as 20 °F (-6°C) provided that substrates are completely dry, free of moisture, and clean as previously described.
5. For best gun-ability, sealant temperature should be in the 60°F to 80°F (15°C to 27°C) range.

F. Clean Up
1. After using sealant primers or two-part polysulfide, clean tools and equipment with xylene, or similar solvent.

G. Curing
1. Initial cure within 24 hours, complete cure in approximately 7 days. Cure times depend on temperature and humidity.

3.7 PROTECTION

A. Protection: Protect all areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

B. Cleaning: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Upon completion of application, remove all remaining smears and stains resulting there from and leave the Work in a clean and neat condition.

END OF SECTION

SECTION 131140

SWIMMING POOL PLASTER

PART 1 - GENERAL

1.1 REFERENCE

A. Requirements in Addenda, Alternates and Conditions collectively apply to this work.

1.2 DESCRIPTION

A. Principal Work Items Are:
   1. Swimming pool plaster finish.
   2. Swimming pool start-up and maintenance.

B. Related Work Not in this Section:
   1. Swimming pool shotcrete: Section 131122
   2. Cementitious waterproofing: Section 131125
   3. Swimming pool sealants and caulking: Section 131130
   4. Swimming pool tile: Section 131145
   5. Swimming pool general requirements: Section 131150

1.3 SUBMITTALS

A. Samples: Prepare 12-inch square panel at the site showing color and texture for pool plaster. Finished plasterwork shall match the approved sample panel.

B. Certificates: Submit certificates attesting that the materials furnished meet the requirements specified herein.

C. Test Report: Submit results of domestic water analysis.

1.4 PRODUCT DELIVERY AND STORAGE

A. Deliver manufactured materials to site in manufacturers' original unbroken packages or containers bearing manufacturers' name and brand labels. Keep cementitious materials dry until ready to be used and stored off the ground, under cover, and away from damp surfaces.

1.5 JOB CONDITIONS

A. Apply plaster in exterior swimming pool only when ambient temperature is above 40°F and below 90°F, and protect applied plaster from rapid drying by sun or wind until curing is completed or pool is filled with water. Protect interior plaster applications from construction debris. Make every effort to apply plaster as late in the construction schedule as possible to avoid staining or damage to the finish. Stains or damage that occur as a result of inadequate care may result in the rejection of the installation and require complete removal and re-installation at the contractors expense.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I white Portland cement.

B. Hydrated Lime: ASTM C206, Type S.

C. Sand for Pool Plaster Finish Coat: White marble dust uniformly graded within following limits, all passing the No. 30 sieve:

Percentage retained (by weight, plus or minus 2%) on each sieve

Sieve Size	Minimum	Maximum
No. 30	0	30
No. 50	40	55
No. 100	70	80
No. 200	80	100

D. Water: Clean, fresh, from domestic potable source.

2.2 PROPORTIONS AND MIXING

A. Materials are specified on a volume basis and shall be measured in approved containers that will insure that the specified proportions will be controlled and accurately maintained during the progress of the work. Measuring materials with shovels ("shovel count") is not permitted.

B. White Marble Pool Plaster Finish Coat: Mix finish in proportion of one part by volume of white portland cement to not more than two parts by volume of sand (specified white marble dust).

C. Mixing: Perform mixing in approved mechanical mixers of the type in which quantity of water can be controlled accurately and uniformly. While mixer is in continuous operation, charge approximately 90% of estimated quantity of water, half of sand, all cement, and the other one-half of the sand into mixer in that sequence and mix thoroughly with remainder of water until mixture is uniform in color and consistency. Avoid excess mixing to prevent hasty solution of cement resulting in accelerated set. Discard plaster which has begun to set before it is used; re-tempering is not allowed. Do not use any caked or lumpy materials. Completely empty mixer and mixing boxes after each batch is mixed and keep free of old plaster.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

A. Clean base surfaces of projections, dust, loose particles, grease, bond breakers, and foreign matter; make sufficiently rough to provide a strong mechanical bond. Do not apply plaster directly to the surfaces of masonry or concrete that is coated with any membrane-forming curing compound or similar agent until compound or agent is completely removed by sandblasting. Thoroughly wash entire surface with 6,000-psi high-pressure water immediately prior to plastering. Wet cementitious base surfaces with a fine fog water spray to produce a uniformly moist condition and check screeds, pool equipment, and accessories for correct alignment before plastering is started. Do not apply plaster to base surfaces containing frost. Install temporary coverings as required to protect adjoining surfaces from staining or damage by plastering operations.

3.2 APPLICATION OF PLASTER

A. General: Apply finish plaster to minimum ½-inch thickness at any location. Apply finish plaster by hand or machine. If plastering machine is used, control fluidity of plaster to have a slump not exceeding 2-1/2 inches when tested using a 2" by 4" by 6" high slump cone. Do not add additional water to the mix subsequent to determining water content to meet this slump. Perform slump test according to following procedure:
   1. Place cone on level, dry, non-absorptive base plate.
   2. While holding cone firmly against base plate, fill cone with plaster taken directly from hose or nozzle of plastering machine, tamping with a metal rod during filling to release all air bubbles.
   3. Screed off plaster level with top of cone. Remove cone by lifting it straight up with a slow and smooth motion.
   4. Place cone in a vertical position adjacent to freed plaster sample using care not to disturb base plate.
   5. Lay straightedge across top of cone being careful not to vibrate cone; measure slump in inches from bottom edge of straightedge to the top of slumped plaster sample.

B. Workmanship: Apply finish plaster in two coats by "double-back" method with second coat applied as soon as first coat is tamped and initially floated. Apply plaster with sufficient pressure to provide a good bond on bases. Work plaster to screeds at intervals of from 5 feet to 8 feet, or closer as required on curved surfaces. Finish plaster to tolerance of -0 to +1/8 inch in thickness on curved surfaces and to 1/8 inch in 8 feet on straight surfaces. Apply smooth trowel finish without waves, cracks, trowel marks, ridges, pits, crazing, discoloration, projections, or other imperfections. Form plaster carefully around curves and angles, well up to screeds. Take special care to prevent sagging and consequent drooping of applications. Produce surfaces free of visible junction marks in finish coat where one day's work adjoins another.

C. Curing: Cure plaster with fine fog water spray applied to finish coat as frequently as required to prevent dry-out of plaster. Keep plaster damp until pool is filled. Prevent damage or staining of plaster.

D. Patching, Pointing, and Cleaning Up: Upon completion, cut out and patch loose, cracked, damaged, or defective plaster; patches matching existing plaster in texture, color, and finish, flush with adjoining plaster. Perform pointing and patching of surfaces and plasterwork abutting or adjoining any other finish work in a neat and workmanlike manner. If 10 per cent or more of the pools plaster finish is found to be defective, the plaster shall be removed and replaced completely for the entire pool. Remove plaster droppings, voids, holes or spattering from all surfaces. Leave plaster surfaces in clean, unblemished condition ready for pool filling. Remove protective coverings from adjoining surfaces. Remove rubbish and debris from the site.

3.3 START-UP SPECIFICATIONS

A. Contractor shall employ a qualified water testing agency to analyze the domestic water with which the pool will be filled within 2 weeks of the plaster date, and shall employ a swimming pool experienced, water chemistry consultant to determine types and quantities of chemicals required to ensure calcium-balanced water immediately upon the completion of water filling.
   1. Have on hand quantities of the chemicals as determined above, plus 25% overage for follow-up treatment. These chemicals, typically including calcium chloride, bicarbonate of soda, and muriatic acid, are in addition to standard chlorine/chlorine products and alkalizer/pH control products required elsewhere.

B. Care shall be taken in filling the pool to assure that the water source is clean and potable and free of contaminants that could stain the fresh plaster. Flush all water lines that have not been in continuous operation before filling the pool.

C. The pool shall not be plastered until the filtration system and chlorination system are complete and ready for start-up. Contractor shall notify the Owner in writing of start-up at least two weeks prior to the plaster date. The Owner is responsible for supplying chlorine/chlorine products and alkalizer/pH control products for maintenance of the pool by the automatic treatment systems. Should these automatic treatment systems fail or if the Contractor fails to notify the Owner as required, the Contractor shall supply all chemicals required for manual treatment of the pool water.

D. Contractor shall maintain swimming pool for a minimum 14 consecutive days in conjunction with the mechanical system operational test. This maintenance period shall be extended with the mechanical system operational test if required per specifications. During this time, brush the entire pool plaster surface daily starting immediately after filling pool for a minimum of 5 days to remove plaster dust, periodically clean grates until no further accumulation of foreign material occurs, and add chemicals as required for acceptable water quality. The pool shall be vacuumed to maintain a clean and new condition throughout the minimum 14 day period starting no sooner than 5 days after the date of plaster. In no instance shall the pool maintenance and cleaning responsibilities cease prior to gainful occupancy of the entire facility by the Owner. After successful conclusion of the mechanical system operational testing, clean grates, vacuum pool, and leave the pool ready for use.

END OF SECTION

SECTION 131145

SWIMMING POOL TILE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this Section. Principal items include:
   1. Ceramic tile for swimming pools and spa.

1.2 QUALITY ASSURANCE

A. Reference Standard: Conform to the following standards unless otherwise required herein:
   1. American National Standards Institute (ANSI):
      a. A108.1 Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile Installed With Portland Cement Mortar.
      b. A137.1 Standard Specifications for Ceramic Tile.
   2. American Society for Testing and Materials (ASTM):
      a. C144-84 Aggregate for Masonry Mortar
      b. C150-85 Portland Cement
      c. C171-69 (r84) Sheet Materials for Curing Concrete
      d. C206-84 Finishing Hydrated Lime
   3. Tile Council of America (TCA): Latest Edition, Handbook for Ceramic Tile Installation.

1.3 SUBMITTALS

A. Refer to Division 1 for procedures.

B. Product Data: Submit the tile manufacturer's printed data identifying each field tile unit and each trimmer and shaped unit by model or type number.

C. Samples: Submit the following for selection and approval.
   1. Each type, shape, and trimmer of tile in each required color.
   2. Joint grout colors for each color of tile.

D. Master Grade Certificates: Submit for each lot of tile before installing.

1.4 PRODUCT DELIVERY AND STORAGE

A. Deliver tile materials to site in unopened factory containers sealed with Grade Seals bearing printed name of manufacturer and the words "Standard Grade". Keep the Grade Seals intact and containers dry until tiles are used. Keep cementitious materials dry until used.

1.5 JOB CONDITIONS

A. Inspect and verify job conditions. Report all defects in base surfaces to Architect/Engineer for correction before proceeding.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS

A. Portland cement: ASTM C150, Type II, low alkali

B. Hydrated lime: ASTM C207, Type S.

C. Mortar sand: ASTM C144, at least 4% passing No. 100 sieve.

D. Joint sand: Same as mortar sand, except all passing the No. 30 sieve.

E. Water: From domestic potable source.

F. Color pigments: Pure ground mineral oxides, non-fading, alkali and lime proof, factory weighed and packaged.

2.2 TILE MATERIALS

A. Manufacturer: Dal Tile, American Olean, or approved equal.

B. Standard Grade conforming to ANSI A137.1. Provide trim units as indicated and specified, including special shapes as detailed or required. Tile patterns and colors shall be as indicated and specified.

C. Unglazed Ceramic Mosaic Tile: Colors as selected or scheduled, porcelain type unglazed ceramic mosaic tile, with cushion or all-purpose edges, 1" square. Use factory-made half-size units where required for tile numbers, or make the half-size units by precision cutting on powered tile saw. Ease all cut tile edges prior to installation.

D. Glazed Waterline, Lane Marker and Depth Marker Tile: Glazed tile units of sizes indicated, with depth and other markings indicated fired into the tile, with colors as noted and bright glaze finish standard.

E. Trim Units: Provide tile trim units where indicated or necessary for complete and finished installation. Provide bullnose units for external corners and angles. Internal corners shall be squared. External corners shall be mitered. Provide trim units of material and finish identical to adjoining tile, except slip-resistant surfacing is not required for curved or vertical trim units. Provide special type slip-resistant tread nosing units as indicated.

2.3 SETTING BED MORTAR

A. Manufacturer: LATICRETE International Inc., 3701 Fortified Mortar Bed, thick bed mortar. Polymer fortified blend of carefully selected polymers, Portland cement and graded aggregates. Exceeds ASTM C270 Requirements. Mix and Apply in accordance with Manufacturers recommendations.

2.4 BOND COAT

A. Manufacturer: LATICRETE International Inc., 254 Platinum. Exceeds ANSI A118.4 Shear Bond Strength Requirements & ANSI A118.11. C Mix and Apply in accordance with Manufacturers recommendations as a Bond Coat.

2.5 THINSET

A. Manufacturer: LATICRETE International Inc., 254 Platinum. Exceeds ANSI A118.4 Shear Bond Strength Requirements & ANSI A118.11. C Mix and Apply in accordance with Manufacturers recommendations.

2.6 WATERPROOF AND FRACTURE RESISTANT MEMBRANE

A. Manufacturer: LATICRETE International Inc., Hydroban. Waterproof and fracture resistant membrane. Mix and Apply in accordance with Manufacturers recommendations.

2.7 EPOXY TILE JOINT GROUT

A. Manufacturer: LATICRETE International Inc., SpectraLOCK PRO Premium Grout, patented high performance epoxy grout. Mix and Apply in accordance with Manufacturers recommendations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of dust, dirt, oil, grease, and deleterious substances. Conform to applicable Reference Standards and to recommendations of manufacturers of materials used.

B. Substrates To Receive Mortar Setting Beds: Keep cementitious backing damp for at least 8 hours and scrub with a neat Portland cement slurry just prior to placing setting bed mortar.

C. Tile Wetting: Dampen tile according to above Reference Standards or tile manufacturer's instructions, as required.

D. Screeds: Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

3.2 TILE INSTALLATION

A. Arrange tile according to patterns detailed, set tile flush with well-fitted joints, finish in true planes, that are plumb and square, and with joints of uniform size. Provide approved trimmers as shown or required. Cut tile without marring. Carefully grind and joint tile edges and cuts. Set tiles to avoid puddles and ponding in large fields and arrange curved field joints at radiuses that minimize joints and tapered grout joints.

B. Mortar Bed Set Tile: Apply specified setting bed mortar, tamp, and screed to required planes. Spread no more mortar than can be covered with tile before initial set. Do not use re-tempered mortar. Trowel 1/32" to 1/16" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of each tile placed. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and proper plane. Complete all beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. Adjust any out-of-line or out-of-level tile.

C. Joint Sizes: Install tile with uniform 1/8" joint width.

D. Ceramic Tile Joint Grouting: Grout tile joints full after washing out and saturating with clean water. Mix grout with water to a thick creamy consistency and force into joints for entire joint depth, flush with surface. Clean off all excess and fill skips and gaps before grout sets. Use white grout throughout. Provide dampness for minimum 3-day curing and polish with clean dry cloths.

3.3 CLEANING:

A. Remove stains, cement, grout, and foreign matter after grouted joints are fully set. Do not use any acid for cleaning. Repair all defective joints until approved.

END OF SECTION

SECTION 131150

SWIMMING POOL CONTRACTOR GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Requirements in Addenda, Alternates and Conditions collectively apply to this work.

1.2 SUMMARY

A. Principal Work Items Are:
   1. Pool Contractor Qualifications and Responsibilities:

B. Related Work Specified Elsewhere:
   1. Swimming Pool Shotcrete: Section 131122
   2. Cementitious Waterproofing: Section 131125
   3. Swimming Pool Sealants and Caulking: Section 131130
   4. Swimming Pool Tile: Section 131145
   5. Swimming Pool Piping: Section 131153
   6. Swimming Pool Equipment: Section 131154

1.3 SUBMITTALS

A. Submit all information required in this Section when bidding.

1.4 POOL CONTRACTOR QUALIFICATIONS

A. It is the intent of the Owner to award this Contract based on the specific experience and financial means required to complete the specified swimming pool system. The successful bidder must be regularly engaged in the construction of commercial pools. Each bidding Contractor shall demonstrate their specific experience and competency by complying with the following requirements.
   1. The Pool Contractor must provide a written statement from an approved bonding company certifying that the Contractor can qualify for 100% Performance and Labor - Material Bonds on this Project.
   2. The Pool Contractor shall provide evidence of having a Contractor's License A or Contractor's License C53 for this project.
   3. The Pool Contractor shall show evidence of having adequate experience in constructing commercial pools. In order to be considered for this Project the Pool Contractor must have completed within the last five years at least five public use 50-Meter size pools with a shotcrete structure with tile and plaster finish and a perimeter overflow gutter in conjunction with a self-modulating surge and balance tank system. All these pools shall have been in operation for at least one year. Submit a list of such projects with the name, address, and current telephone number of the Owner and Architect for reference.
   4. The Pool Contractor shall have completed at least three additional major commercial pool projects (no less than 25-Yards) within the last 5 years. Submit a list of such projects with the name, address, project cost, and current telephone number of the Owner and Architect for reference.
   5. Cast-In-Place Concrete construction in lieu of Shotcrete construction is not acceptable and pools built of Cast-In-Place Concrete will not be considered in assessing the required experience of the Pool Contractor.

1.5 POOL CONTRACTOR RESPONSIBILITIES

A. The Pool Contractor shall be responsible for at least the following phases of the Work:
   1. Providing labor, material, management and coordination of own personnel and specialty subcontractors experienced in commercial pool building to produce a functioning Swimming Pool including structure and equipment ready for public use upon completion of the Work.
   2. Layout and excavation for pool and piping trenches.
   3. Reinforcing steel placement, shotcrete pool shell and gutter.

4. Swimming Pool sealants and caulking.
5. Pool gutter and Surge Chamber Cementitious Waterproofing.
6. Deck equipment and inserts, tile work in pool and on deck edge, pool plaster, and gutter grating.
7. Pool filtration system and circulation system, valves, pumps, chemical feed equipment, heaters, water level control system, and all items necessary to operate the entire system properly.
8. Swimming Pool and related equipment Start-Up as stated in Section 131153, Article 3.16 including minimum consecutive 14-day trouble-free operation.
9. Pool shell interior finish preparation and painting including initial water fill and initial chemical balancing, Ryznar Stabilization, Langelier Index.

END OF SECTION

SECTION 131153

SWIMMING POOL PLUMBING, MECHANICAL & CHEMICAL EQUIPMENT

PART 1 - GENERAL

1.1 REFERENCE

A. Requirements in Addenda, Alternates and Conditions collectively apply to this work.

1.2 DESCRIPTION

A. Principal items include:
   1. Pool piping and fittings, valves, strainers, hangers and supports, and identification.
   2. Instrumentation and controls.
   3. Hi-Rate Sand filters.
   4. Pumps.
   5. Heaters.
   6. Chemical control monitors.
   7. Pool system cleaning, start-up, and testing

B. Related Work Not in this Section:
   1. Water supply, gas supply and waste services.
   2. Electrical power services to pool equipment with final connections.

C. Description of Piping System:
   1. Piping is shown in diagrammatic form to indicate work to be done, rather than show exact routing and locations. Make use of all data in Contract Documents, verify against developed field conditions, and install work in an orderly arrangement in a manner to overcome structural interference.
   2. Fixtures and equipment are laid out per requirements of one manufacturer. Modify work and arrangements to suit actual equipment installed.
   3. Architectural and structural drawings take precedence over plumbing drawing in representation of general construction work; drawings of various trades take precedence in representation of work of these trades. Refer to all drawings for conditions relevant to this work.

1.3 SUBSTITUTIONS

A. Reference in this section to any material, product or process by name, make or catalogue number shall be interpreted as establishing a standard of quality and design intent and not construed as prohibiting substitutions of any other such material, product or process, provided such substitution is specifically approved by the Engineer.

B. Acceptance of substitutions will not relieve the Contractor from responsibility for complying with the Contract Documents.

C. At the discretion of the Engineer, testing of samples of materials proposed for substitutions may be required. An independent testing laboratory selected by the Owner shall do testing, the costs of which shall be borne by the Contractor.

D. At the discretion of the Engineer, the Contractor may be required to furnish a written guarantee, in addition to that already required, ensuring the satisfactory performance of the proposed substitutions.

E. All additional labor and materials that may be required for the proper installation of any substitution, or required as a consequence of any substitution, shall be provided at no additional cost to the Owner.

F. Bids shall be based upon the data given in the Contract Documents, or upon previously approved items or techniques as "approved equals" by the Engineer. Substitutions must be submitted to the Engineer at least ten days prior to the bid opening for approval. Where calculations or shop drawings are required for approval, allowance shall be made for meeting the requirements of the Contract Documents and all applicable codes and ordinances.

G. The Contractor assumes full responsibility that substituted items or procedures will meet the job requirements and is responsible for the cost of redesign and of modifications to this and all other parts of the work caused by the substituted items.

H. Submittals will be checked for general conformance with the design concept of the project, but acceptance does not guarantee the quantities shown and does not supersede requirements to properly install work. Submittals for proposed alternatives will be judged not only for the acceptability of the items themselves, but of the items as they are used under the conditions of this particular project.

1.4 QUALITY ASSURANCE

A. Pump and Equipment Quality: Pool pumping, filtration, and water treatment control equipment shall be standard products manufactured for service in public and commercial swimming pool installations and shall have a proved record of satisfactory service

B. Reference Standards: Conform Work of this Section to requirements of the following reference standards, as applicable, unless otherwise required herein or on the Drawings. Unless otherwise indicated on the Drawings, or specified, furnish the highest or best grade of material specified in reference standards.

C. American National Standards Institute (ANSI)

1.	A13.1 2007	Scheme for the Identification of Piping Systems
2.	B16.5-1996	Steel Pipe Flanges and Flanged Fittings (Including Ratings for Class 150, 300, 500, 600, 900, 1,500, and 2,500)
3.	B31.1-2001	Power Piping

D. American Society for Testing and Materials (ASTM):

1.	A36	Carbon Structural Steel
2.	A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
3.	A123	Zinc Coating (Hot-Dip Galvanized) on Iron and Steel Products
4.	A312-83	Seamless and Welded Austenitic Steel Pipe
5.	D3915-06	Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds for Plastic Pipe used in Pressure Applications
6.	D1785-12	Polyvinyl Chloride (PVC) Plastic Pipe: Schedules 40, 80 and 120
7.	D2464-13	Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
8.	D2467-13A	Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
9.	D2564-12	Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings

E. Manufacturers Standardization Society of Valves and Fittings Industry (MSS):

1.	SP-58-2009	Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation
2.	SP-69-2003	Pipe Hangers and Supports - Selection and Application.

F. National Fire Protection Association (NFPA) 70: 2014 National Electric Code (NEC)

1.5 SUBMITTALS

A. Manufacturer's Data, provide Electronic Copies:

1. Pipe
2. Fittings
3. Valves, each type
4. Piping specialties
5. Hi-Rate Sand filters
6. Pumps, each type
7. Pump strainers
8. Heaters
9. Inlet fittings and outlet grates
10. Chemical control monitors
11. Instrumentation and controls
12. Flow meter
13. Chlorinator and injector

14. Chemicals
15. CO2 Feed System

B. Operation and Maintenance Manual, provide Electronic Copies:
1. Sand filters
2. Pumps, each type
3. Heaters
4. Chemical control monitor
5. All controls
6. Chlorinator and injector
7. CO2 Feed System

C. Posted Operating Instructions: Pumping and valve identification code and chart with isometric of pool piping, valve functions, and operating procedure. See Article 3.14 of this specification:

D. Filter Media Sample: Submit one-pound representative sample of each type (#20 and #30, if both are specified) filter media from the filter manufacturer for written approval. Submit 2 copies of approval letter to Engineer prior to loading media into filter vessels.

E. Record Drawings: See Spec. Section 01700, Contract closeout, "Project Record Documents", for data required and recording method.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Pool Piping: Pool piping including overflow, fill line, drain piping, re-circulating line, and chlorine circulating line shall be manufactured of compound meeting requirements for ASTM D1784-95 Class 12454-B (formerly Type 1, Grade 1). Pipe and fittings shall be Schedule 80 PVC unless otherwise specified. Piping shall conform to ASTM D1785-12. Fittings shall be injection molded and conform to ASTM D2467-13a for socket type and ASTM D2464-13 for threaded type. Solvent cement for pipe joints shall conform to ASTM D2564-12.

2.2 PIPING IDENTIFICATION LABELS

A. Plastic slip-on labels or tape with pressure-sensitive adhesive conforming to ANSI A13.1 2007.

2.3 HANGERS AND SUPPORTS

A. MSS SP-58-2009, with types as required MSS SP-69-2003. Refer to “Seismic Restraint Manual: Guidelines For Mechanical Systems, 3rd Edition, 2008,” published by SMACNA with OSHPD #R-0010.

2.4 VALVES

A. Provide end connections as indicated. Valves shall open when turned counterclockwise.
1. Ball Valves Sizes ½-inch through 3-inch: True union socket design suitable for use as a block valve, full port with replaceable Teflon ball seals and Buna-N stem and body seals, pressure rating of 150 psi at 73°F. Valves shall be manufactured of the same PVC Type I, Grade I molding compound as the fittings to assure compatibility.
2. Butterfly Valves Sizes 2-inch through 5-inch: PVC body with bubble-tight corrosion-resistant Buna-N liner, Buna-N "O" ring shaft seals, stainless steel shaft, polypropylene disc with manual operator. Asahi/American, or approved equal.
3. Butterfly Valves 6-inch through 12-inch Size: PVC body with bubble-tight corrosion-resistant Buna-N liner, Buna-N "O" ring shaft seals, stainless steel shaft, polypropylene disc with gear operator. Asahi/American, or approved equal.
4. Check Valves:
    a. Spring Check, Sizes 2-inch and Smaller: PVC body, non-slam, silent, spring check valve with stainless steel lift disc, Buna-N seals, stainless steel spring, 2 psi maximum pressure loss when fully open, rated working pressure of at least 125 psig, and threaded ends. Val-Matic, or approved equal.

b. Silent Check, Sizes 2-inch and Larger: PVC body and internals, non-slam, silent, spring check valve with stainless steel lift disc and body bolts, Buna-N seals, stainless steel spring and spring-loaded lift disc, 2 psi maximum pressure loss when fully open, rated working pressure of at least 125 psig, with flanged ends or flangeless wafer body of configuration and design for installation between ANSI B16.5 125 lb. flanges. Val-Matic, or approved equal.

B. Flow Control Valve: Hydraulically operated, pilot actuated automatic control valve. Valve and control system shall control flow and maintain the set flow regardless of changes in line pressure. Valve shall have two parts: body of stainless steel, and elastomer liner or control element; with flow coefficient of 0.9 or greater, Roll Seal Valve Co.

C. Modulating Valve: Epoxy coated cast iron body and cover, bronze trim, Buna "A" elastomeric rubber parts. Valve shall be hydraulically operated diaphragm-actuated, globe pattern with rubber disk with rectangular cross section contained on 3-1/2 sides by disk retainers and forming a tight seal against the removable seat insert. Diaphragm assembly shall contain a valve stem fully guided at both ends by suitable bearings integral with cover and valve seat. Diaphragm assembly shall be the only moving valve part and shall form a sealed chamber in upper portion of valve, operating from line pressure. Diaphragm shall be reinforced; piston actuators are not acceptable. Valve shall have flanged end connections. Cla-Val Co. #124-13.

1. Float Control: Float actuated multi-port pilot valve providing non-modulating, two position, on-off operation. Extension rods and hardware shall be stainless steel and float polypropylene. Cla-Val Co. #CF1

2.5 INSTRUMENTATION

A. Pressure and Vacuum Gauges: Stainless steel case 2-½ inch diameter with phosphor bronze bourdon tube, brass connection and glass face, glycerin-filled. Scale readings of 0-60 psi for pressure and 0-30 inches of mercury. US Gauge Series 550, or approved equal.

B. Dial Thermometers: Stainless steel case and stem with 30°-130° F scale range and 3-inch diameter face. Letro #SL1-D, quantity as indicated in the drawings.

C. Flow Meter

1. Flow Measuring Device: Sensor consisting of electromechanical volumetric flow transducer generating sine wave output of frequency and amplitude linearly proportional to paddle wheel rotation rate. Four permanent magnets imbedded in the paddle wheel shall pass a coil in the sensor body inducing alternating voltage proportional to rotation. Paddle wheel shall be open cell design to eliminate cavitation at flow velocities from 1.0 FPS to 50 FPS, with accuracy of ±1% over full range with a repeatability of ±0.5% over full range. Flow sensor shall send 0-225 Hz pulse (at one volt per one foot/second of flow velocity). Install flow sensor in return pipe. Insert flow sensor in pipe with PVC saddle fitting. Provide a plug for insertion into pipe fitting when sensor is removed, +GF+Signet #P51530.
2. Flow Indicating Meter: Meter shall show flow rate in gallons per minute, operating on signal generated by paddle wheel flow sensing device, and shall not require external power. Provide a 5-1/2-inch dial activated by a 250° damped meter movement within a waterproof case indicating flow within a scale range of 0-5,000 GPM. The 100-microampere meter movement shall provide accuracy of ±2% of full scale and repeatability of ±1% of full scale. Meter shall allow installation up to maximum of 200 feet from flow sensor location, +GF+Signet #3-5100.

D. Auxiliary Flow Meter Short piro flow gage flow meter for installation in either horizontal or vertical applications, all parts hard drawn polished brass and Plexiglas, one moving part accurate precision instrument, scale calibrations engraved, suitable for pressures to 250 psi, C.W. Cox, Inc. Provide one auxiliary flow meter for the spa jet system and 1 for each chemical bypass loop.

E. Auxiliary Flow Meter: Pitot tube flow meter with hard edged float design, complete with machined acrylic meter body, 316 stainless steel float, printed scale with 50 - 150 GPM range, stainless steel mounting clamps, and gasket seal, Blue White Industries, CF-300.

F. Pump Time Clock: Four station electric 24-hour time clock controller with 14-day programming capability, 9-60 minute timing per station, manual over-ride each station, wall mounted and including transformer.

2.6 EPOXY COATING

A. All surfaces of all ferrous metals shall be grit blasted to white metal, then shall receive 3 to 10 miles of pneumatically applied epoxy: Engard 480, Keysite 740, Tnemec 104 or equal. All surfaces shall be inspected for proper mil thickness and pinholes or holidays.

2.7 GALVANIZING

A. Ferrous metal: Provide, where indicated, hot dip galvanized coatings conforming to ASTM A123, ASTM A153, or ASTM A386.

2.8 STRAINERS

A. Y-Pattern with bronze body, socket ends, and pressure rating of 150 psi at 70°F. Strainer basket shall have an open area of at least twice the pipe size and permit maintenance without removing strainer body from the line. Mueller, or approved equal.

2.9 FLANGED PUMP STRAINER

A. Strainer Body: 125 psi rated cast-iron body with IPS flanged connections of full line size, bottom drain plug, and quick opening yoke type cover. Coat pump strainer lid, brackets and wetted surfaces with Kesite 740 epoxy coating, the same as specified for sand filters. Lid yoke and handle shall be machined for proper alignment and sealing on gasket to body, Muessco, or approved equal.

B. Strainer Basket: Provide stainless steel basket with 5/32-inch perforations and minimum total open flow area of not less than 4 times open area of the pipe size. Furnish one extra stainless steel pump strainer basket.

2.10 POOL CIRCULATION PUMP AND SPA BOOST PUMP (Close Coupled Pump Specification)

A. Manufacturer: PACO Pumps, Type LC, model numbers as indicated in the drawings or equal.

B. Type: Horizontal-mounted, bronze-fitted, end suction, single-stage, close-coupled, fusion bonded epoxy coated interior and exterior surfaces, centrifugal pump with non-overloading characteristics for the capacity, head, and service indicated and complying with the following requirements;

C. Pump Casing; The pump casing shall be close grain cast iron fitted with a replaceable lead-free bronze case wear ring. Pumps with a specific speed greater than 1600 shall have a double volute casing with suction splitter to reduce radial loading and shaft deflection. All pumps shall be of the back pullout design so that the rotating element can be removed from the casing without disconnecting the suction or discharge piping. Casing shall be provided with tapped and plugged holes for priming, venting, drain, and gage connections.

D. Impeller: The impeller shall be of the enclosed type Francis vane design, cast lead-free bronze and shall be statically and dynamically balanced. Impeller diameter shall be trimmed for the specified design conditions and fitted to the shaft with a key.

E. Shaft Sealing: Pump shaft shall be fitted with a leakless mechanical seal suitable for the temperatures and pressures indicated with a suitable arrangement to provide adequate portion of the pumped liquid to lubricate and cool the seal faces.

F. Pump Base: To ensure full benefit of the pump back pullout feature, entire pumping unit shall be mounted on a cast iron base with drip rim using cap screws. Pumps shall not be secured with floor studs.

G. Motor: Grease-lubricated, ball-bearing, totally enclosed fan cooled, induction type for the full voltage start, horsepower and voltage indicated. Motor horsepower's shown are estimated minimum and larger motors shall be furnished, if necessary, to meet the non-overloading requirements within the nameplate horsepower of the motor. Pump shall not exceed nameplate rating of motor over the entire range of the performance curve. Provide premium efficiency motor.

H. Parts: All normally required spare parts shall be available in kit form selectable from the pump nameplate. It shall not be necessary to reference any drawing when selecting spare or replacement parts.

I. Energy Evaluation: The Contractor shall insure that alternative pumps submitted will meet the design flow, head and efficiencies as outlined. Pumps submitted that do meet not the specified efficiencies shall require an analysis of operating costs based upon 24 hours per day, 7 day a week operation. Contractor shall credit the Owner for the difference in operating costs based on a five-year operation.

2.11 SPA CIRCULATION PUMP

A. Manufacturer: Pentair WFK Series, model numbers as indicated in the drawings.

B. Type: Self priming, extra close coupled, horizontally mounted, single-stage, centrifugal pump with non-overloading characteristics for capacity, head and service as indicated and complying with the following requirements:

C. Pump Casing: Centerline discharge, foot supported, back pullout design, threaded connections, and constructed of Noryl thermoplastic. Casing shall be provided with tapped and plugged holes for venting, drain and gage connections.

D. Impeller: Noryl thermoplastic single-suction enclosed type, statically and hydraulically balanced.

E. Seal: Pump shall be provided with a heavy duty ceramic and carbon mechanical shaft seal for leak less operation with suitable arrangement to provide adequate portion of the pumped liquid to lubricate and cool the seal faces. Mechanical seal shall be suited for the service indicated.

F. Hair and Lint Strainer: Noryl thermoplastic body, with commercial size 6-inch diameter basket type strainer having an open area equal to 5 times the suction port unless shown otherwise.

G. Pump Base: Integral with single piece strainer pot and volute.

H. Pump Motor: Commercial grade 56 frame, energy efficient, continuous duty swimming pool motor, shaft of rust proof 303 grade stainless steel, sealed and permanently lubricated ball bearings, horsepower and voltage indicated. Motor horsepower's shown are estimated minimum and larger motors shall be furnished if necessary to meet the non-overloading requirements.

2.12 SUBMERSIBLE SUMP PUMP

A. Pump shall be unit type mounted on an ABS plastic base, automatic vertical centrifugal, of capacities and heads as scheduled with cast iron casing with strainer, cast iron impeller mounted on stainless steel shaft, mechanical shaft seal with carbon and ceramic faces, sealed oil-filled double ball bearing motor, adjustable mercury float switch, stainless steel fasteners, and grounding 3-wire waterproof power cord and plug. Entire unit shall have pump manufacturer's standard paint finish suitable for the service. Hydromatic #SW33A-1, quantity one.

2.13 POOL AND SPA FILTERS

A. Manufacturer: Pentair Triton TR 140-C

B. Type: Provide a pressure high-rate permanent media filter system produced by a company regularly engaged in the manufacture of water filtration equipment and having at least five years successful experience in manufacturing high-rate filters for both public and institutional applications. Filter system shall be vertical type suitable for a single grade of media and bear National Sanitation Foundation (NSF) Seal of Approval for maximum flow of 20 gallons per minute per square foot of filter area.

C. Components: Provide filter system with vertical filter tank as indicated, having a total effective filter area of 7.06 square feet, complete including slide valve, 0-60 psi pressure gage, air relief valve, backwash sight glass, and an internal distribution and collection system.

D. Filter Tank: Provide 36-inch diameter two-piece filter tank, constructed of compression-molded fiberglass with O-ring seal and zinc plated bolts. Tank base shall be structural foam-molded polyethylene with holes for bolt down.

1. Connections and Nipples: Include the following for each tank:
    a. Two 2-inch connections in filter tank to serve as influent, and effluent connections.
    b. One 1-1/2-inch capped nipple in lower front to serve as winterizing or media dump port connection.
    c. One 8-inch port in the top of the tank to allow easy installation and maintenance of the sand bed.

2. Internal Distribution and Collection System: Equip tank with internal components that are hydraulically balanced to prevent migration of filter media during filtration cycle and that uniformly fluidizes media during backwash cycle without channeling or breakthrough at any location. Provide collection system of molded ABS and PVC.

E. Backwash Valving: Provide a bronze manual backwash slide valve on filter tank with two positions; filter to pool, and backwash to waste.

F. Filter Media: Uniformly graded silica sand free of clay or limestone, all Grade #20, effective size of 0.45 millimeter, maximum 1.4 uniformity index; media must have prior written approval of filter manufacturer. Provide 925 pounds of the filter media for each filter tank unless the manufacturer of filters approved for installation specifies a different quantity.

G. Hardware: Provide zinc-plated fasteners (nuts, bolts, washers, etc.) throughout entire system and components.

H. Manual: Furnish printed and bound manual covering the operation, servicing, and maintenance of filtration system, prepared by manufacturer.

2.14 POOL AND SPA HEATERS

A. Manufacturer: RayPak Digital or Lochinvar Energyrite Commercial Swimming Pool Heater with Vertical Venting, cupro-nickel heat exchangers, and factory vent cap, Model Numbers as indicated in the drawings Provide additional Cold Run System equipment package provided as additional equipment from the manufacturer.

B. The swimming pool heaters shall be of the direct-fired boiler type having an input ratings as indicated in the drawings and shall operate at a minimum of 86% thermal efficiency. The boilers shall be capable of being operated on Natural Gas.

C. Requests for substitutions for the specified make and model will not be considered unless equal to the specified system in every respect and must be submitted to the specifying agent not less than 10 calendar days prior to bid date. Requests for substitutions must include a sample of major components with all specified features; complete documentation relating to all the specified features; and manufacturer's sales literature, engineering drawings, and installation/operation/maintenance manuals. Failure to provide these or any other information necessary to confirm that all specified features are provided will be cause for rejection of substitution request.

D. Heat Exchanger: The boiler wetted section shall be a gasket-less Cupro Nickel heat exchanger, with straight Cupro Nickel tubes having extruded integral fins spaced 7 fins per inch. The tubes shall terminate into a one piece, glass lined, cast iron header. There shall be no bolts, gaskets or "O" rings in the heat exchanger configuration. The heat exchanger will be tested to 240 psi and shall be approved for 160 psi working pressure by the ASME.

E. Combustion Chamber: The combustion chamber shall be of the fan assisted sealed type, completely lined with "Lock-Heat" ceramic tile insulation, requiring only 3-inch clearance from combustible walls. The burners shall be constructed of "310" stainless steel and fire on a horizontal plane. The boiler shall have a combustion air blowers. The boiler operating controls will provide for constant control of fuel/air ratio for consistent, high thermal efficiency.

F. Outer Jacket: The outer jacket shall be of unitized, non-welded, self supporting shell construction, fabricated of 18-gauge galvanized steel and finished with an acrylic industrial coating. The unit shall be designed to fit through standard commercial doorways, not greater width than 36 inches. The boiler shall be designed to allow for stacking of one unit on top of another, allowing for floor space conservation.

G. By-Pass: The boiler shall be furnished with a factory supplied plumbed by-pass assembly to insure proper operation without condensation.

H. Operating Controls: Standard operating controls shall include immersion temperature and limit controls for swimming pool water temperature, a pool safety high limit and auxiliary heater high limit control. The auxiliary temperature controls will be factory installed in a weatherproof enclosure. The main control panel shall have a master switch with an indicator light and an operation indicator lights.

1. The standard operating control system shall include a hot surface ignition system with full flame monitoring capability. Main gas valve will have built in low gas pressure regulators. Addition standard controls shall include a water pressure switch, blocked flue pressure switch, low air pressure switch for the fan, low voltage transformer for the 24 VAC control circuit, ASME temperature and pressure relief valve and a lubricated gas plug cock.
2. A 24 VAC control circuit and components shall be used. All components shall be easily accessed and serviceable.

I. Approvals and Ratings: The boiler shall be listed and approved by the American Gas Association under the appropriate ANSI test standard. The unit shall bear the ASME "H" stamp for 160 psi working pressure and shall be National Board listed. The boiler must also have an independent laboratory rating for Oxides of Nitrogen (NOx) of 9.9 ppm corrected to 3% O2. NOx ratings will be submitted to regional Air Quality Management District.

J. Start Up and Instructions: A factory trained service technician will start up the swimming pool boiler. Verification of adequate gas pressure as boiler is firing and confirmation of draft potential of vent system will be confirmed. By-pass will be set for proper operating temperature.

K. Printed and bound operating, installation and service manuals with exploded parts list shall be supplied with the boiler.

2.15 CHEMICAL CONTROL MONITOR

A. Manufacturer: Becsys System 5 for the Pool and Spa

B. An integrated microprocessor-based electronic water treatment control system shall be furnished.

C. Controller

1. The control system and touch screen display shall be housed in independent nonmetallic NEMA 4X rated enclosures. The enclosures and connections shall be designed to eliminate any possibility of corrosion or damage to the internal components of the controller. Controller and external relays shall be factory wired and tested for functionality.
2. Controller shall have a 6" alphanumeric, touch screen display with constant backlighting. Overlay shall be treated to resist influence of ultraviolet ray degradation.

   The screen will continuously display information related to the following:

   a. Rate of flow (gpm)
   b. Flow volume indicator
   c. pH within a range of 2-12 with a .1 pH resolution
   d. HRR within a range of 0-1000 mV with a 1 mV resolution
   e. Langlier Saturation index (LSI) and Ryznar Index (RI) displayed with last calculated evaluation date stamp
   f. Temperature
   g. pH and Chlorine chemical inventory
   h. Name of pool
   i. Date, time and alarm status
   j. ppm within range of .02-20 ppm with .1 resolutions
   k. Alarm Display shall be a flashing touch screen graphic and shall be provided with visual pH and chlorine/bromine feed pump graphics which are activated as chemicals are being fed. Controller shall also display paused mode of proportional chemical feed. Visual alarm indicators to warn operator of any chemical or filtration alarms.

D. Monitoring and Operating Displays

pH level shall be continuously monitored and displayed digitally on the touch screen, within a range of 2-12 with a .1 pH resolution. Touch screen pH set points shall be programmable to limit operator selection of pH set points to comply with health code limitation. HRR level shall be continuously monitored and digitally displayed in millivolts (mV) on the touch screen, within a range of 0-1000 mV with a 1 mV resolution. Touch screen HRR set points shall be programmable to limit operator selection of HRR set points to comply with health code limitation. Temperature of the swimming pool water shall be capable of being continuously monitored, controlled and digitally displayed on the unit touch screen. Flow rate shall be continuously monitored and displayed digitally on the touch screen. pH and chlorine inventory shall be continuously monitored.

E. Output Circuits

Four controller output circuits shall be provided and capable of handling standard line voltage at 5 amps each for pH and chlorine/bromine feed control, for the time clock controlled functions, and for a master alarm signal. Fuses shall be used to protect solid state relay controlled outputs. (Optional) Four additional output circuits shall be provided and capable of handling standard line voltage at 5 amps each for the time clock controlled functions, and for a master alarm signal. Fuses shall be used to protect solid state relay controlled outputs. Automatic outputs shall be capable of being manually overridden with touch screen interface for pH and HRR, and chlorine/bromine shall be provided to allow for direct and complete manual override. The closing of any of these momentary contacts will switch incoming line voltage directly to the feeder output circuit.

F. Chemical Feed Programming

1. The control system shall be capable of being programmed for either standard on/off feed control or a time based proportional feed control mode. Time based proportional feed logic shall automatically adjust, within a settable time base of 10-600 seconds, the operating time of the feed unit, cycling on and off if unit falls below set point. Cycling time will be variable based upon continuance of set point variation. The unit shall also provide for a “proportional band” of 0-99 mV or 0-1.5 pH units. Minimum feeder “on time” shall be no less than five seconds to ensure proper pump performance. The controller shall govern the output of any chemical feeder from 10% to 100% of maximum rated capacity. The system shall operate in such a manner as to make unnecessary, under ordinary or extraordinary conditions, any manual increase or decrease of feeder output settings by operating personnel in order to maintain set point. Units allowing only on/off control of chemical feeders or requiring use of special proportional-band feed devices (4-20 mA or 0-100 strokes per minute inputs) to achieve proportional control shall not be considered equal.

G. Chemical Failsafe Indicators, Alarms, and Warnings

1. The control system shall be provided with pH and HRR feed indicators, which shall be activated when respective chemicals are being fed.
2. System shall be provided with visual high and low pH and HRR alarms. High pH alarm shall prevent soda ash and hypochlorite feed and low pH alarm shall prevent acid feed and gas chlorine feed. High HRR alarm shall disable HRR oxidant feed.
3. System shall be capable of accepting a low voltage on/off flow indication signal via hard wire connection on internal circuitry. The system shall provide a low flow warning message to alert operator when no flow situation exists in the sample stream. Should a no flow condition exist, the system shall disable all chemical feed functions.
4. The control system shall be provided with an internal microprocessor based failsafe (feed duration alarm) circuit that shall disable the appropriate chemical feeder(s) and energize an alarm circuit in the event of: a) sensor failures, b) chemical feeder malfunctions, and c) depletion of chemical supply.
5. The failsafe (feed duration) alarm mode shall be programmable from 0 through 24 hours with 1 minute resolution. In addition, an internal software switch shall make it possible to disable the failsafe (feed duration) alarm circuit entirely without affecting other controller operations. Units incorporating mechanical-type overfeed timers shall not be considered equal.
6. An alarm condition shall activate a remote master alarm signal, provided as a dry contact closure, enabling the use of 0-280 VAC alarms.

H. A microprocessor circuit shall provide control over a sensor rinse function or any other chemical feed function activated on a time basis. The timer shall energize a solid-state relay.

I. Controller shall be capable of logging up to sixty eight days of data relating to pH and HRR readings; any alarm conditions; any set point adjustments; and feed event history. Frequency of logged input points shall be selectable from 1 – 60 minutes. Controller shall be capable of downloading logged data onto an IBM compatible computer using MODBUS, Ethernet, modem or direct cable and software, which shall be provided with the controller.

J. The logic of the system shall include a three level security code system, allowing access to pH, HRR, ppm, temperature and alarm set points. Security system will allow separate manager [two codes]; operator [six codes] and a factory authorized system entry. Security system shall also provide history of access identified by user.

1. The controller shall be equipped with a plug-in printed circuit board (PCB) with a 33,600 baud rate modem providing remote interface with a PC and remote system communication with any touch tone telephone. The PCB and modem shall be an integral part of the chemical control feed control system and shall enable service and operating personnel to perform the following functions:
2. Remotely access current pool water conditions and controller status.
3. Remotely download historical data relating to water chemistry readings, alarm status, feed event history, and set point adjustments.
4. Remotely adjust feed set points, feed modes, and alarm set points.
5. In the event the system detects that chemical levels, flow rates or other alarm conditions have violated their user selectable limits, it shall automatically begin an alarm dial-out sequence of programmed telephone numbers. Once an alarm sequence begins, numbers will be called in order until one of them is answered and acknowledged by entering an appropriate number code.

K. Windows Based Software
1. Software shall be Windows based interactive designed specifically for monitoring and controlling pool water chemistry. The Software shall be compatible with all versions of Microsoft Windows□. DOS based software will not be accepted.
2. Software shall have a Graphical User Interface and Water Database Management Package.
3. Software will allow for direct and/or remote access and manipulation of all functions related to the controller. Long-term operational data shall also be retrievable on-site or from a remote location.
4. All software parameters shall be programmable and accessible through an organized step level-programming tree with pop-up windows prompting for a value.
5. Software shall enable user to change setting by clicking on the desired option.

L. Flow cell and sensor assembly - The control system shall include a sensing chamber, a flow switch, and sensor assemblies, all of which shall incorporate the following features:
1. An integral self-air purging sensing chamber designed to accommodate four sensing devises shall be provided. The chamber body shall be PVC with a clear polycarbonate inspection cover. All plumbing, PVC Schedule 80, consisting of shut off valves, backflow device, nipples, elbows, sampling cocks, compound gauge and flow switch shall be supplied.
2. The flow switch shall be of the paddle wheel-style with see-through cover and “on stream” light. Flow switch shall indicate flow (at least .9 gpm) through the sample stream and signal the controller to initiate an alarm condition and to shut off feed circuits in the event flow should stop. Flow switch shall operate on low voltage and be made of non-corrosive material. Flow cell and plumbing shall be mounted to a back panel housed with a gasketed enclosure.
3. pH and HRR sensor shall contain no less than 50 milliliters of electrolyte gel to assure reasonable electrode life. The gel used in each electrode shall be inorganic so as to prevent degradation by chlorine or bromine. The Redox sensor shall be of the patented HRR technology. HRR sensing electrode shall incorporate at least 1 square centimeter of 99.99% pure platinum and operate in temperatures between 32 - 150□ F (0 – 66□ C). Each electrode shall use a porous Teflon liquid junction to minimize the chance of liquid junction clogging and prolong electrode life. pH and HRR sensors shall incorporate shielded BNC connectors to insure continuity of connection. To insure accuracy and compatibility, the controller manufacturer shall manufacture the sensing probes. Electrodes not utilizing the above technology or organic gels or wood or ceramic liquid junctions or connectors other than shielded BNC will not be considered equal to these specifications.
4. Temperature sensor shall be of the RTD type having a two (2) wire cable of the low noise type with appropriate connectors. Cable and connectors shall meet or exceed Military Specifications. To insure accuracy and compatibility, the controller manufacturer shall manufacture the sensing probes.
5. Flow Sensor is a Signet self-powered paddlewheel low flow sensor with saddle fitting shall be provided. Cast mounting saddles shall be provided with U-Bolts for mounting.
6. Free ppm sensor shall be a membrane sensing with electrolyte liquid junction type. The connection shall be a three (3)-wire cable of the low noise with appropriate connectors.

M. An automatic sensor wash system shall be provided. The system shall consist of one 6-gallon vapor-proof tank, one feed pump capable of pumping up to 10 gallons per day at 75 psi, and a four-function anti-siphon/pressure relief valve. Digital programmable electronic timer in the chemical controller shall control the pump.

N. The packaged system enclosure shall be fabricated of ¼" thick non-corrosive DuPont cast acrylic. The cabinet configuration shall be achieved by heat forming followed by solvent welding. The enclosure shall have integral support bracing for added strength and separation of wet and dry chambers. A clear acrylic cover shall be provided and will allow for observation of the controllers operation without the need of the cover's removal.

O. An integrated solid state device (s) shall be furnished to protect each microprocessor based chemical controller from excessive line voltage at controller and on ethernet line(s). AC line voltage suppression shall be LP-999-00010. Ethernet line protection shall be LP-999-00020.
   1. In line (AC) Surge Suppression - Device shall be housed in a tamper proof enclosure provided with mounting tabs and have ½" NPT hardwire connection, with LED indicator light. Suppressor to be U.L. listed.
   2. Phone Modem Line Voltage Protection - Device shall be housed in tamper proof enclosure provided with mounting tabs, ground lug and male/female receptacle plugs for phone line connections. Device to be U.L. Listed.

P. Start-up and warranty

The system shall be provided with an illustrated installation, operating and maintenance manual. Drawings and detailed written description of features and operating phases of the control system shall be a part of the operating and maintenance manual. The control system shall be provided with on-site start-up, on-site operator training, and one (1) year of on-site warranty service, all of which shall be performed by a representative trained and authorized by the controller's manufacturer. The system shall carry a twenty four (24) month limited warranty against defects in material and workmanship for all components including electronics, flow cell assembly and probes

2.16 CHLORINE GENERATION SYSTEM

A. A Mineral Springs, ChlorKing integrated saline electrolytic chlorinator shall be furnished for use on indoor/outdoor pools and spas. The chlorinator is composed of an electrolytic cell that is intended to be connected to the plumbing of the pool/spa circulation system, a DC source assembly that is mounted to a supporting plate.

B. Requests for substitutions for the specified make and model will not be considered unless equal to the specified system in every respect and must be submitted to the specifying agent not less than 10 calendar days prior to bid date. Requests for substitutions must include a sample controller with all specified features; complete documentation relating to all the specified features; and manufacturer's sales literature, engineering drawings and, installation, operation, and maintenance manuals. Failure to provide these or any other information necessary to confirm that all specified features are provided will be cause for rejection of substitution request.

C. Listing/Approvals - The saline electrolytic chlorination system, shall be NSF International standard 50 listed, UL 1081 listed, and certified for use in pools and spas. Models with noted listing and approvals are as follows:

D. Power Control / Voltage Limiter Module - Module will contain the following components:
   1. Power cord (120v models) or contactor (220v models); rated 272v and 20amp.
   2. Transformer; rated 115/230 Vac secondary rated 24 Vac and 6VA UL.
   3. Fuse holder and fuse rated 250V and 30amp.
   4. Hours Meter rated 115 vac at 60hz.
   5. Potentiometer for controlling system chlorine output.
   6. Potentiometer is located on side of module enclosure for easy access and is secured by a threaded nut.
   7. SCR Power Controller shall be provided to regulate amperage through the systems electrical components with a 20amp rating for 120v model, and a 20 or 30amp rating for 220v models.
   8. Enclosure shall be rain proof sheet metal box NEMA type 3r.
   9. Wiring shall be type THHN or MTW from cover control; 12 AWG for 20 amp systems and 10 AWG for 30-amp system. 18 AWG will be used for low amperage control.

10. All components used with in the module shall be UL and CSA recognized.

E. Buck Booster Transformer shall contain the following components:
1. Conductor of low voltage high current design and is sized per system chlorine output. Conductor shall be rated at 105c 300v.
2. Ground terminal block rated per system requirements.
3. Enclosure shall be rainproof sheet metal box NEMA type 3R.
4. All components used within the transformer shall be UL and CSA recognized.

F. Rectifier / Polarity Reversing Module:
1. Module will perform a two step function, one indicating chlorine production output via DC amp meter installed on front of enclosure, and two; reversing polarity to chlorine production cell in order to minimize scale build up on titanium electrodes located in cell. Module will be of water-cooled design in order to maximize efficiency of DC voltage to cell.
2. Module will contain the following components:
   a. Conductor of low voltage high current design and is sized per system chlorine output. Conductor shall be rated at 105c 300v.
   b. Single and dual thyrister component sized per chlorination system output rating and secured to mounting panel.
   c. Water cooled heat sink; cooling circuit is manufactured of aluminum and is secured to the thyrister modules. Water connections are made outside of Rectifier/Polarity Reversing Module to minimize risk of leaks. Water connections are plumbing into pool/spa recirculation system.
   d. Ammeter, minimum 2.5-inch size mounted to door of module and seal with gasket.
   e. Output cables to electrolytic production cell shall be a low voltage high current design.
   f. Cables sizes are shown in the table below. All cables sized are minimum and are rated at 105c.

Chlorinator Module Number	Cable Conductor Size
ChlorKing (15 lbs per day)	10 AWG
ChlorKing (7.5 lbs per day)	10 AWG
ChlorKing (2.5 lbs per day)	12 AWG

   g. Bridge rectifier will be secured to the water cooled heat sink with multiple fasteners and sized per chlorinator model.
   h. Over voltage relay secured to the DIN rail.
   i. Timing relay secured to the DIN rail.
   j. Delay relay secured to the DIN rail.
   k. Reversing contactor rated between 30adc minimum to 75adc maximum sized per chlorinator model.
   l. Enclosure shall be rain proof sheet metal box Nema type 3R.
   m. All components used within the Rectifies/Polarity Reversing module shall be UL and CSA recognized.

G. Electrolytic Chlorine Production Cell - One cell will be provided with each chlorine generating system. Cell will be manufactured of schedule 80 PVC with influent and effluent water connections of 1-inch threaded male connections. Cell will be constructed with quick release thread cap to access electrodes. Positive and negative electrodes will be housed inside cell and secured to cap. Electrodes will be made out of titanium metal alloys. Cell shall be secured to chlorinate system mounting plate.

H. System Marking - All labeling shall be temperature resistant self-adhesive labels; 2mil polyester stock with #350 adhesive. UL recognized component marketing system used for permanent labeling.

I. Connections - Liquid tight non-metallic flexible conduct with mating fitting shall be utilized to connect all major components modules. Fittings shall be UL listed and sunlight resistant. Nominal ½-inch conduct is used between the Power Control/Voltage Limits module and Transforms enclosure. Nominal 1-inch or 1 ¼-inch conducts is used between the transform enclosure and the Rectifier/Polarity Reversing Module. All fitting are secured to enclosures with mating nuts.

J. Mounting - All systems components listed above shall be mounted on aluminum back plate for wall mounting vertical or horizontally as required.

K. Start Up and Warranty
1. The system shall be provided with an illustrated installation, operating and maintenance manual. Drawing and detailed written description of features and operating phases of the control system shall be a part of the operating and maintenance manual.
2. The chlorinator system shall be provided with on-site start-up, on-site operator training, and limited 2 year warranty; A) 1 year on all electrical items B) 2 years or 15,000 hours which ever occurs first, pro-rated hourly on titanium electrodes all of which shall be performed by a representative trained and authorized by the controller's manufacturer.

2.17 Eko^3 ™ SYSTEMS, INC. MODEL B - pH-MTS CO_2 FEED SYSTEM

The carbon dioxide feed system specified under this section shall be capable of feeding carbon dioxide gas (CO2) into the recirculation system of a swimming pool for the purpose of adjusting the pH range of the water to preset limits. The specified system shall work in concert with an automatic water chemistry control device.

The CO2 Feed System specified herein will be the standard cataloged product of a company regularly engaged in the manufacture of such devices for use on public and institutional applications. The packaged CO2 Feed System will be a skid mounted factory assembled unit with the following features: feed control console, mass transfer system with a 1 HP pump, compound gauge, rate of feed control and indicator, a contact chamber, interconnecting piping, and a transformer with housing and wire for remote installation.

A. FEED RATE

The Model B - pH-MTS shall have a feed capacity range of 0 to 170 SCFH of CO2.

B. MASS TRANSFER SYSTEM
1. Mounting Skid
A structural support skid will be provided and shall be 12" x 23" in size and made of a non-corrosive material with support legs. The skid is to be drilled to receive bolted hold-downs for all components of the system. The skid will be provided with four 3/8" x 3" anchor bolts with nuts and washers for hold down and leveling.
2. Booster Pump
The pump housing will be made of AISI 304 stainless steel and the impeller shall be molded of Noryl/AISI 316 stainless steel for maximum corrosion resistance. A mechanical seal will be provided between the pump housing and the motor. The seal will be a precision lapped, highly polished carbon-ceramic stainless steel shaft seal, assuring drip proof protection. The motor will be a 1 HP, single phase, 115/230 VAC, 60 cycle, and 3450 RPM. The motor will be a NEMA 'C' face flange mounting with a drip proof enclosure. The motor will be equipped with sealed ball bearings to provide for smooth, quiet operation. Mounted to the motor will be a low voltage activated relay with 115/230 VAC contacts, the relay will be mounted inside a junction box.
3. MTS Injector and Piping
A 1 1/2" IPS schedule 80 PVC manifold shall be provided which will incorporate a 1 1/2" Polyethylene Ram, venturi style, and injector. Service unions shall be provided allowing for the removal of the piping and the injector assembly.
4. Contact Chamber
A contact chamber will be provided. The tank will be of a heavy-duty corrosion resistant type being of the one-piece fiberglass type. The chamber must be supplied with a top and bottom entry of 1 1/2" IPS. The contact chamber vessel will have a designed working pressure of 150 psi with a 4 to 1 safety factor. The tank will be 10" x 35" and will contain an internal enriched CO2 diffusion system.

C. FEED CONTROL SYSTEM AND TRANSFER CONTROL
1. Enclosures

The feed control system and low voltage transformer will be housed within their own 6" high, 6" wide and 4 3/8" deep, non metallic enclosures built to NEMA 12 specifications. The enclosures shall be provided with screw seal closures.

The feed control system will be mounted directly to the pH MTS and the transformer housing will be designed for wall mounting next to the water chemistry control unit. Both units will be provided with all necessary control wiring and electrical connectors.

2. Solenoid Valve
   An industrial grade solid brass 3/8" normally closed solenoid operated valve will be mounted into the feed control system enclosure. The solenoid valve will be 24 VAC and will be controlled by an automatic pH/HRR controller through a low voltage transformer.
3. Feed Indicator Light
   A feed indicator light will be mounted in the cover of the feed control system. This light shall indicated the feeding of CO2 gas and the activation of the solenoid valve.
4. Flow Meter
   An in-line flow meter, capable of reporting flows of 0-200 SCFH, will be installed into the feed control system enclosure. The flow meter will also provide CO2 rate of flow adjustment.
5. Transformer
   The unit will transform 120 VAC to 24 VAC. The transformer will be UL listed. The transformer will be mounted to a 4" x 4" back plate using its' own built in feet. A 18/2 outdoor rated service cord will be provided (50 ft.) for connection between the transformer and the junction box and relay of the booster pump. A 16/3 wire x 9' cord with plug shall be provided for connection to the water chemistry controller.
6. Transfer Tubing
   3/8" I.D. polyethylene tubing will be used as transfer tubing within the pH MTS system.
7. Gauge
   A 2" compound gauge, reading 30" hg. to 100 psi, will be installed at the CO2 discharge connection of the feed control system.

D. CO2 STORAGE TANK

Provide a 600-pound capacity cryogenic CO2 storage tank design in accordance with ASME code. The tank will have a minimum usage rate of 3.2 pounds per day and a maximum continuous gaseous flow rate of 20 pounds per hour. The tank will be a double walled vacuum-jacketed pressure vessel. The inner vessel will be stainless steel and shall be wrapped with insulation. The tank shall include a pressure building system that includes a 7.5 amp, 120 VAC heater that extends into the storage tank and the liquid CO2. A gas use regulator, a safety relief valve, and burst disc shall be supplied as part of the storage tank.

A no-loss single hose fill system shall be provided. The unit shall be of the venturi type and shall work by collapsing the tank head pressure during filling to allow the tank to be filled from 1/3 full to full without venting any CO2 . The tank shall be filled through an exterior, wall mounted fill station at a rate of 30 to 50 pounds per minute. The filling operation shall be fully automatic and be capable of being completed without entering the area housing the storage tank. The fill box shall include a quick disconnect, automatic closure coupling and lockable door.

E. INSTRUCTIONS

Printed and bound operating, installation and service manual with exploded parts list shall be supplied with the pH-MTS.

F. WARRANTY

A 1-year manufacturer's warranty shall be provided covering all components of the pH-MTS specified herein. The warranty shall be unconditional.

2.18 WATER LEVEL CONTROL SYSTEM

The water level controller shall be supplied as a unit, including modular sensor, control, and actuator system. The System shall be solid state, with non-corrosive components, NEMA 4 enclosures and all components suitable for use in a pool and mechanical room environment. The system shall provide fine control and adjustability, ease of operation, service, and accessibility. The pool water level shall be controlled automatically within +/- 1/8" (12mm) of nominal water level. ELC-800

A. Water level control system shall be comprised of a sensor (which installs at nominal water level), a control panel, a sensing line and a solenoid valve.

B. Sensing configuration shall be installed according to the drawings and specifications.

C. Sensing units shall be installed at nominal water level, in a safe and convenient location according to drawings and specifications. On the Balance tank sight glass 1 ½ " od transparent tube.

D. Sensor is designed with solid state construction. Units with floats, moving parts or electrodes will not be considered as equal and shall be rejected.

E. Sensor shall be connected to control panel by 25 ft. or control wire standard with system. Control wire up to 200 feet in length is available optionally.

F. Control panel is designed with solid state construction, and approved for installation by all applicable by-laws and regulations.

G. Control panel display features indicate power to unit, feed status, and feed alarm status.

H. System is designed with adjustable feed alarm, adjustable to initiate an alarm after 30 minutes of feed time, 60 minutes of feed time, or to override feed alarm for continuous feed.

I. System includes a twenty-five second time delay between sensing low level and initiating water feed. The purpose of this feature is to eliminate feed errors due to wave action in surge/balance tank and pool/spa static line.

J. System also features a trim timer on the front panel to adjust between 2 and 300 seconds, the delay between sensing adequate water level and terminating feed. The purpose of this feature is to eliminate "chatter" of solenoid valve at desired water level.

K. Line voltage shall be 120 VAC;50/60Hz; 1 AMP with 6' power cord and plug provided.

L. The controller incorporates a step down transformer to provided 24 vac, 1 amp supply to fill valve. PCB to incorporate an integral poly fuse for load protection to fill valve.

M. Solenoid valve will be sized according to the drawings, and shall be normally closed/slow closing 24 VAC, 10 watts maximum, as supplied with the level control system.

N. Level control system shall be Model ELC-800- (as manufactured by AquatiControl Technology), complete with 2" NPT slow closing solenoid valve.

O. System Designed and supplied by AquatiControl Technology of Englewood, CO. 877-755-8817 www.aquaticontrol.com

2.19 MAIN DRAIN GRATES

A. Spa stainless steel grate and frame, polished type 304 stainless steel, 18-inch by 18-inch square with not less than 155 square inches of open area. Grate shall be made of 3/16-inch stainless material with openings not greater than 3/8-inch and ribs not less than 1/4-inch. Fit grate to frame flush with top surface and secure with 4 or more stainless steel vandal proof screws, frame shall be fabricated from 1/8-inch x 1/2-inch type 304 stainless angle iron and shall be provided with required bonding lugs and anchoring holes, Champion Products, Redondo Beach, California.

B. Pool stainless steel grate and frame, polished type 304 stainless steel, 24-inch by 24-inch square with not less than 212 square inches of open area. Grate shall be made of 3/16-inch stainless material with openings not greater than 3/8-inch and ribs not less than 1/4-inch. Fit grate to frame flush with top surface and secure with 4 or more stainless steel vandal proof screws, frame shall be fabricated from 1/8-inch x 1/2-inch type 304 stainless angle iron and shall be provided with required bonding lugs and anchoring holes, Champion Products, Redondo Beach, California.

2.20 GUTTER GRATES

A. Non-corrosive non-conductive Cycolac grate and frame, 12-inch by 12-inch square with not less than 78 square inches of open area. Fit grate to frame flush with top surface and secure with 4 or more stainless steel vandal proof screws, Hayward #SP-1032.

2.21 HYDROTHERAPY JETS

A. Molded ABS plastic body with 1-1/2-inch diameter inline water and 1-inch diameter air connections. Jet heads shall protrude 3/8-inch maximum from finished wall of spa and have a 3/4-inch diameter flow fitting capable of 360-degree rotation. Provide each jet with an extension designed for installation in concrete walls. Hydro Air Industries, Model #16-5275 Microssage.

2.22 EYEBALL WALL INLET FITTINGS

A. 1-inch diameter orifice eyeball inlet fitting consisting of an ABS plastic body, retainer ring, directional ball type nozzle, 1½-inch solvent weld connection, and construction shield. Body shall have an integrally molded flange around its outer perimeter that is buried in plaster, functioning as a waterstop. Secure eyeball to the body with four 18-8 stainless steel screws. Sta-Rite #8429.

2.23 FLOOR INLET FITTINGS

A. Molded ABS plastic with an adjustable top plate having a position-locking device and 2-inch solvent weld connection. Provide manufacturer's wrench for flow adjustment. Flow adjustment top plate shall permit full range of flow adjustment from closed to full open with a stainless steel vandal proof locking device at quarter turn increments. Sta-Rite #8417.

2.24 SKIMMERS

A. Molded ABS plastic body with 10-inch diameter heavy-duty deck plate and frame, removable strainer basket, 2-inch IPS connections, and equalizer line with flush mounting inlet fitting. Frame shall be adjustable to permit variations in height and angle of deck in relation to skimmer. Skimmer throat with 8-inch wide molded weir and hinge shall automatically adjust to 4-inch variations in pool water level. Provide spring loaded check valve in equalizer line, adjustable trimmer valve attached to base for flow equalization, and float valve assembly to seal off the upper portion of the skimmer during low water level conditions, Sta-Rite U3 Skimmer #8650-1404.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install material and equipment as complete, convenient, and economical systems in conformance with drawings, approved submittals, and requirements specified.

3.2 PIPING

A. Unless specified otherwise, all piping fabrication, assembly, and installation shall conform to ANSI B31.1. Run the piping following the general arrangement indicated. Accurately cut pipe to measurements established on site and work into place without springing or forcing, except where cold springing is indicated. Run piping out of the way of windows, doors, other openings, light fixtures, electrical conduit, equipment, and other piping. Run overhead piping in most inconspicuous places. Do not bury, conceal, or insulate piping until piping has been inspected, tested, and approved. Locate pipe joints where easily inspected. Provide flexibility in piping connection to equipment for thermal stresses and vibration. Support and anchor piping connected to equipment to prevent strain from thermal movement, vibration, and weight from being imposed on equipment.
   1. Fittings: Use standard molded PVC fittings. Mitering pipe to form elbows, notching straight runs to form full-sized tees, or similar construction is not permitted. Make all branch connections with tees. Fabricated fittings are permitted for pipe sizes 14” and larger.
   2. Clearances: Provide adequate piping clearances from walls, ceilings, and floors. Provide at least 6-inch for pipe sizes 4-inch and less, 10-inch for pipe sizes over 4-inch and in corners with sufficient clearance.
   3. Cleaning of Piping: Clean pipe before placing in position. Before final connections are made to apparatus, wash interior of all piping out thoroughly with water.
   4. Identification of Piping: Identify piping in accordance with ANSI A13.1, using adhesive backed or snap-on labels and arrows. Apply to finished paint or insulation at intervals of not more than 50 feet. Provide two copies of the piping identification code framed under glass and install where directed.

5. Pipe Size Changes: Use reducing fittings for changes in pipe size. Use of bushings will not be permitted. In horizontal lines 2½-inch and larger, use reducing fittings of the eccentric type to maintain the bottom of the lines in the same place.
6. Grading of Pipe Lines: Unless otherwise shown, install horizontal lines to slope down in the direction of flow with a pitch of not less than 1-inch in 30 feet, except in loop mains and main headers where the flow may be in either direction. Trapping of lines shall not be permitted except where indicated.

3.3 HANGERS AND SUPPORTS

A. Selection and installation of all piping hangers and supports shall conform to MSS SP-58-2009, SMACNA, and SP-69-2003 for the intended temperature ranges. Conform sway bracing to ANSI B31.1 and "Seismic Restraint Manual: Guidelines For Mechanical Systems, 3rd Edition, 2008" published by SMACNA with OSHPD #R-0010. Anchoring shall be as indicated.

3.4 VALVES

A. Install valves in accordance with ANSI B31.1. Install stop valves in supply lines and locate or equip to permit operation from floor level or provided with safe access in the form of walkways or ladders. Install all valves in positions accessible for operation and repair.

3.5 STRAINERS

A. Provide strainers with meshes suitable for the service where indicated and where dirt might interfere with proper operation of valve parts, orifices, or moving parts of equipment.

3.6 INSTRUMENTATION

A. Pressure Gages: Provide shut-off valve or petcock between each gage and the line.

B. Thermometers: Provide separate well or socket for sensing element of each thermometer and thermostatically controlled valve in order to minimize obstruction to flow.

3.7 EQUIPMENT FOUNDATIONS

A. Provide of sufficient size and weight, and of the proper design to preclude shifting of the equipment under operating conditions or under abnormal conditions that could be imposed on equipment. Foundations shall meet the requirements of the equipment manufacturer. When required by the Architect/Engineer, obtain from equipment manufacturer approval of foundation design and construction for equipment involved. Equipment vibration shall be maintained within acceptable limits and shall be suitably dampened and isolated. Concrete foundations shall conform to Part 3 of this specification using 4,500 psi concrete.

3.8 EQUIPMENT INSTALLATION

A. Install each equipment item in accordance with the approved submittals and the manufacturer's installation instructions. Grout the equipment to the concrete foundations before piping is installed. Install piping in such manner as not to place a strain on any of the equipment. Flanged joints shall not be bolted tight unless they correctly match. Provide valves in piping before and after all major pieces of mechanical equipment to allow isolation of the equipment for maintenance. Pool circulation pump and motor shall be re-aligned by the Contractor according to the standards of the Hydraulic Institute after grouting of stand and connection of piping.

3.9 PIPE SLEEVES

A. Provide Schedule 40 galvanized steel pipe sleeves for pipe penetrations through concrete and masonry walls, floors, and roofs, and 20 gage galvanized sheet steel sleeves for penetrations in framed walls and partitions. Secure sleeves in position during construction. Sleeves shall pass through the entire width of the walls, partitions, and slabs and be flush with the finished surfaces, except sleeves through floors shall project 1½-inch above the finished floor. Provide sleeves ½-inch larger in diameter than the pipe or pipe insulation as applicable. Firmly pack the space between pipe or insulation and sleeve with fireproof grout, and caulk both ends of sleeve with plastic cement. Furnish sleeves set in waterproof construction with flanges and clamping rings.

3.10 WATERSTOPS

A. All piping passing through the concrete walls or floors of water holding tanks and pits shall have a PVC flange type waterstop of full pipe size solvent welded on the pipe. Center the waterstop within the wall to form a labyrinth waterseal after concrete pouring.

B. All piping passing through Cored holes in concrete walls of water holding tanks and pits shall have a LINK – SEAL type waterstop. Center the waterstop within the wall to form a mechanical seal between pipe and concrete core inside diameter.

3.11 ESCUTCHEONS

A. Set chrome-plated steel or nickel-plated cast iron plates on all pipes passing through floors, walls, ceilings, and partitions in finished public areas.

3.12 CLEANING OF SYSTEMS

A. Clean the various systems and their components as the installations are completed and before final closing. Remove all foreign matter from equipment and surrounding areas. Preliminary or final testing shall be permitted only in finished areas.

3.13 OPERATING EQUIPMENT

A. Ensure that moving parts of each assembly operate smoothly and easily throughout their entire operating range.

3.14 POSTED OPERATING INSTRUCTIONS

A. General: Provide a chart, at least 24-inch high by 36-inch wide, of minimum 3 mil thick mylar containing the information and instructions specified, mounted on a 1/16-inch thick white plastic laminate backing and covered with 1/8-inch thick transparent polycarbonate plastic sheet. Chart edges shall be framed with narrow stainless steel channels and made watertight. Mount chart on wall where directed by Architect/Engineer using stainless steel fasteners and finishing washers. Chart shall show detailed isometric of piping, pumping, water heating, chemical and chlorine systems, controls, and other items forming a part of the swimming pool equipment, each valve and control identified as to the type and function. Include a printed detailed description and instructions for operating sequences. All information shall conform to approved submittal.

3.15 FIELD TESTS AND INSPECTIONS

A. General: Contractor shall furnish all equipment and apparatus required for performing the inspections and tests, except water supplied by Owner. Contractor shall correct all defects and repeat respective inspections and tests, as required for final approval. Conduct testing and inspecting under observation of the Owner or Architect/Engineer.

B. Test Gages: Pressure test gages shall be currently certified as being accurate to within 1% of their full scale. Use gages with maximum scale between 1½ and 2 times the test pressure.

C. Factory Tests: Factory test prefabricated piping sections and fittings to ensure compliance with this specification and to prove integrity of joints. Submit certified factory test reports.

D. Field Inspections: Prior to initial operation, the piping system shall be inspected for conformance to Drawings, Specifications, and ANSI B31.1.

E. Field Tests:

1. Pressure Tests: Hydrostatically test all water piping systems. Do not pneumatically pressure test. Conduct tests in accordance with ANSI B31.1 and as stated in this specification. Test piping systems after the lines have been cleaned as specified. Test the piping system at a pressure of 100-psi with water not exceeding 100°F. Before tests, remove or isolate gages, traps, and other apparatus subject to damage by test pressure. Install calibrated test gage in system to observe any loss of pressure. Close off system and retain required test pressure for one-hour minimum and inspect all joints and connections for leakage. Maintain a pressure of 30-psi in all lines throughout the remaining construction period. Each trade should verify the 30-psi pressure before and after completion of Work to insure piping integrity. All failures shall be satisfactorily repaired and the complete test performed again.

2. Equipment and Material: Equipment and material certified as having been successfully factory tested to the manufacturer's performance criteria need not be field tested but shall be demonstrated to operate correctly.

3.16 START-UP SPECIFICATIONS

A. Contractor shall employ a qualified water testing agency familiar with both Calcium Saturation Index (CSI) and Ryznar Index (RI) to analyze the domestic water with which the pool is to be filled. Initially water should be adjusted to levels required in order to properly cure pool plaster and maintain plaster warranty. Once pool plaster is sufficiently cured and prior to turnover, water chemistry will be adjusted to satisfy both Calcium Saturation Index (CSI) and Ryznar Index (RI). In order to achieve this compatibility, the CSI will be in the upper ranges (+0.3 to +0.5) and the RI will be in the acceptable range near 6.5 to 6.7.

B. Contractor shall have on hand quantities of the chemicals as determined above, plus 25% overage for follow-up treatment. These chemicals, typically including calcium chloride, bicarbonate of soda, and muriatic acid, are in addition to standard chlorine/chlorine products and alkalizer/pH control products required elsewhere in this specification.

C. System Start-Up and Operational Test: Start up the entire system and operate all components for not less than 14 consecutive days. During this time, periodically clean strainers until no further accumulation of foreign material occurs, and add chemicals as required for acceptable water quality. Adjust all safety and automatic controls for proper operation and sequence. Immediately repair and correct all deficiencies during the operational test and continue the test until 14 days of continual satisfactory performance has occurred without any defects. After successful conclusion of operational testing, clean strainers, backwash filter media, and leave the entire pool systems ready for use.

D. Chemical System Start-Up: Furnish services of a factory trained representative for initial start-up of the chlorination system. Representative shall also instruct Owner's personnel on the operation and maintenance of this equipment. Representative shall provide a follow-up inspection of the system 90 days after start-up providing any further instruction required to the Owner's personnel.

E. Pool Heater Start-Up: Furnish services of a factory trained representative for initial start-up of the pool heaters, providing written confirmation that all aspects of the installation are according to the manufacturer’s specifications. Any valve settings should be permanently marked. Representative shall also instruct Owner's personnel on the operation and maintenance of this equipment. Representative shall provide a follow-up inspection of the system 90 days after start-up providing any further instruction required to the Owner's personnel.

F. Pool Operator Training: The Contractor shall furnish the services of a qualified/credentialed instructor experienced in all facets of mechanical room operation, water chemistry, and water care to train the Owner's personnel in the operation and maintenance of the Work under this Section. This does not relieve individual suppliers' and manufacturers' representatives from responsibility for instruction on individual systems as specified. Perform training, which shall include classroom and equipment room instruction, for a minimum of 16 hours and at the time and place designated by the Owner. The training shall be near the two-week point prior to completion of Work of this Section when the pool is filled and all systems are tested and fully operable. Inform Owner in writing of the proposed training period approximately one week prior to class date, and therein request the names of all Owner's personnel to receive training.

END OF SECTION

SECTION 131154

SWIMMING POOL DECK EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this Section. Principal items include:
   1. Permanent deck equipment
   2. Portable pool equipment
   3. Pool vacuum
   4. Pool water testing kit
   5. Underwater lights
   6. Safety equipment

B. Related Work Not in this Section:
   1. Electrical power services for underwater lights.
   2. Grounding system terminations for ground wires provided under this Section.

1.2 QUALITY ASSURANCE

A. Equipment Quality: Swimming pool equipment shall be standard products manufactured for service in public and commercial swimming pool installations and shall have a proven record of satisfactory service.

B. Reference Standards: Conform Work of this Section to requirements of the following reference standards, as applicable, unless otherwise required herein or on the Drawings. Requirements for packing of delivery in reference standards are at the Contractor's option. Unless otherwise indicated on the Drawings or specified, furnish the highest or best grade of material specified in reference standards.
   1. American Society for Testing and Materials (ASTM):
      a. A312-83 Seamless and Welded Austenitic Steel Pipe
      b. A666-82 Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar for Structural Applications
   2. American Iron and Steel Institute (AISI): 304 & 316 Steel Products Manual - Stainless and Heat Resisting Steels
   3. Aluminum Association (AA):
      a. DAF-79 Designation System for Aluminum Finishes
      b. STDS-79 Aluminum Standards and Data
      c. STDS-79 Standards for Anodized Architectural Aluminum
   4. National Fire Protection Association (NFPA): 70-1987 National Electrical Code (CEC)

1.3 SUBMITTALS

A. Manufacturers' Data; 5 Copies: Include operation and maintenance instructions as applicable:
   1. Hand rails;
   2. Grab rails;
   3. Recessed steps;
   4. Disabled Access lift and socket;
   5. Concrete-filled access covers;
   6. Portable vacuum;
   7. Pool water testing kit;
   8. Underwater lights;
   9. Signs;
   10. Safety equipment.

1.4 DELIVERY AND STORAGE

A. Deliver materials undamaged to the project site in each manufacturer's unopened containers. Inspect for damage and remove damaged items from site. Store undamaged materials off ground under protective cover.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A312, ASTM A666, and AISI Steel Products Manual, of finish and gage as specified or indicated.

B. Plastic: Acryonitrile-butadiene-styrene (ABS) molded plastic, type known commercially as "cycolac".

C. Metal Finishes: Chromium plated metal finish shall conform to Fed. Spec. WW-P-541/GEN. Bronze surfaces to remain exposed shall be chrome-plated unless otherwise indicated or specified. Anodized finish on aluminum shall conform to AA Designation System for Aluminum Finishes and Standards for Anodized Architectural Aluminum, Type A41, Class I, except shall be special anodized finish known commercially as "hard-coat" for use in marine environments, clear finish unless otherwise specified.

D. Fasteners: Fasteners shall be corrosion resistant material, 300 series stainless steel or bronze, same as the metal being attached or secured unless indicated or specified otherwise.

2.2 HAND RAILS

A. Stainless steel type 304 tubing, 1.90" O.D. by 0.145" wall thickness polished to 320 grit, sizes as indicated and vertical risers on indicated centers, and secured to the deck and lower step in stainless steel anchors. Spectrum or KDI Paragon, custom.

B. Anchor Sockets: Stainless, 4-1/4" long, with locking bronze wedge, and stainless steel bolt and washer. Socket shall have four anchoring feet at its base which extend into the concrete and be tapped for attachment of bonding wire. KDI Paragon #28102.

C. Escutcheon Plate: Stainless steel key hole with locking set screw compatible for use with 1.90" OD KDI bronze wedge anchor sockets. Spectrum #35214.

2.3 GRAB RAILS

A. Stainless steel type 304 tubing, 1.90" O.D. by 0.109" wall thickness, ornamental grade, figure "4", finished to 320 grit with bends smooth and wrinkle free, welded joints. Spectrum or KDI Paragon, custom.

B. Anchor Sockets: Bronze casting, 4-1/4" long, with locking bronze wedge, and stainless steel bolt and washer. Socket shall have four anchoring feet at its base which extend into the concrete and be tapped for attachment of bonding wire. KDI Paragon #28102

C. Escutcheon Plate: Stainless steel key hole with locking set screw compatible for use with 1.90" OD KDI bronze wedge anchor sockets. Spectrum #35214.

2.4 RECESSED STEPS

A. Molded white "cycolac" plastic with 1/4" nominal wall thickness, 15-1/2" wide step and non-slip texture on step surfaces. Step shall mount flush with wall and have no protrusions into the pool. Spectrum #23450 or KDI Paragon #32102.

2.5 CONCRETE FILLED ACCESS COVERS

A. Fabricate frames of stainless steel shapes as detailed, all joints and connections fully welded and welds ground smooth and flush. Provide stainless steel lifting hardware as indicated and required.

2.6 PORTABLE DISABLED ACCESS LIFT

A. Manufacturer: Spectrum Swim-Lift® Series, Traveler™ II XRC500. Quantity: Two

B. Lift: The Traveler II XRC is designed for use on in and above ground swimming pools and spas. The user-operated unit requires no assistance from an attendant to operate the lifting device. Operation of the lift handset requires a constant pressure no greater than 2-lbf (8.9N) to operate the directional control buttons. There are two handset control points one located independent of the lift, the other on the lift's seat arm. The lift is powered by a low voltage (24-VDC) rechargeable battery, and is rated for a 500-pound (226.79kg) operating load capacity with a 1.5-safety factor. Components of the lift include an armrest, adjustable footrest and an overhead transfer assist device. The armrest provides stability to the user during lift movement and is structurally capable of supporting the user during transfer from a wheelchair onto the lift's seat. The adjustable footrest is 10-inches (25.4cm) wide with a surface area of 67in² (1.7M²). The detachable overhead transfer assist device allows lifting during transfer from a wheelchair to the lift seat, and consists of a support arm, two stainless steel chains and a stainless steel, 1.50-inch (3.81cm) O. D. tube handle coated with a patented coating to increase grip. The overhead arm, chains and tube support the full load capacity of the lift. The lift is to be secured to a concrete deck with a single anchor point, allowing ease of installation and removal.

C. Lift Superstructure: The Traveler's superstructure and component parts are fabricated of 304 stainless steel, electro-polished followed by passivation ensuring maximum corrosion resistance. This process shall be performed in compliance with ASTM A967 guidelines. The superstructure facilitates a minimum vertical travel of 55-inches (140 cm) and can be set back up to 33-inches (0.85m) from pool/spa edge. The rotational gear drive system allows for full continuous mast rotation. The vertical drive actuator bolted to the superstructure is driven by a permanent magnet motor and operates at a noise level of 67-db or less.

D. Operating Controls and Power Source: A four-channel radio frequency receiver/transmitter controls the operation of the lift. Two handsets are provided to allow operation from pool deck, water and seat. The handsets are operable by either left or right hand and are ergonomically designed for ease of use. The handsets are sealed to prevent water damage. Four control buttons provide directional control, i.e., rotational travel-left or right and vertical travel-up or down. 24-VDC rechargeable battery powers the lift's drive motors and radio frequency control receiver. A battery charger is provided; complete with a mounting bracket and electrical power cord, for remote installation.

E. Seat Assembly: The seat assembly provided meets and/or exceeds the Type "A" Seat as covered by ADA seat standards. The seat measures 18-inches (45.72cm) high, 18-inches (45.72cm) wide and 18-inches (45.08cm) deep, and features a double contour design for seating comfort. The seat is equipped with a seat belt assembly employing wide synthetic webbed belts, with a quick release, non-metallic, cam-lock buckle. The lift's seat shall be mounted so as the lift's seat support arm is located to the right side of the seat, providing comfort and stability to the user.

F. Anchor: The lift's anchor body is 1.90-inch (4.8cm) I. D. by 6-inches (15.24cm) deep. An anchor cover with a removal key shall be supplied for use when the lift is not installed.

G. Swing-up Outer Armrest Assembly and Headrest: The swing-up outer armrest assembly is supplied with a 304 stainless steel mounting plate to be attached to the lift by mounting directly under the lift's seat assembly. The headrest assembly works in concert with the swing-up arm assembly. The headrest support members are fabricated of 304 stainless steel. The headrest pad is formed synthetic foam, molded in one piece with a protective skin, ensuring durability and ease of cleaning and maintenance.

H. Mate™ Cart: The optional Mate Cart allows an attendant to move the Traveler to any desired location on the pool deck, and use the lift without an anchor. *Note: When used with the MateTM the Travelers lifting Capacity is reduced to 350 lbs. Quantity, One (1).

I. Protective Safety Cover: The optional polyethylene safety cover protects the lift from unauthorized use and from environmental elements. The cover includes a warning sign clearly visible from the pool/spa deck.

J. Extra Battery: An extra battery is available; allowing one battery to be charging while the other is in use.

K. Compliance and Certification: The lift complies with the requirements of the U. S. Architectural and Transportation Barriers Compliance Board, Architectural Barriers Act of 1968, Section 502 of the Rehabilitation Act of 1973, Section 504 of the Americans with Disabilities Act of 1990, the Accessibility Guidelines for Recreation Facilities of September 3, 2002, and ADA and ABA Guidelines for Buildings and Facilities 2004 – Chapter 10 Recreation Facilities, Section 1009 Swimming Pools, Wading Pools, Spas, Sub-paragraphs 1009.2 through 1009.2.9.

L. Warranty: A two (2) year limited warranty is provided for the Swim-Lift Traveler™ II XRC500.

M. The lift and its accessory items are manufactured by Spectrum Products®.

2.7 DELUXE PORTABLE VACUUM

A. Manufacturer: Maxi-Sweep III.

B. Cart: Heavy-duty, 1" tubular frame, .083 wall thickness, 3/16" bottom plate steel, 1/8" x 1" formed fit strap on a stair climbing cart with 4.10 x 3.50 x 4" wheels and non-marking pneumatic tires, gray, non- marking rubber bumper strip, made of naturally cure rubber compound, with 1/8" x 3/8" x 22" long metal insert, one each mounted on front and rear edge, mounted with four aluminum anti-rust rivets, 3/16" diameter with 5/8" large flange, on a 600 pound payload, rust inhibiting polyester polyurethane, thermal set powder coated cart.

C. Pump: Heavy-duty, 2" self priming, rust inhibiting polyester polyurethane thermal set powder coated cast iron pump, rated 8,000 gallons per hour, water flow.

D. Filter: Stainless steel filter canister with three (3) 5" diameter x 24" long removable, washable, Dacron filter cartridges that have a flow rate of 225 square feet per minute, with a pressure gauge and air relief valve, and stainless steel "V" tabs for mounting on a cart.

E. Hair and Lint Strainer: 8" heavy-duty rust inhibiting polyester polyurethane, thermal set powder coated cast aluminum hair and lint strainer pot with casted 2" hose adapter inlet nipple, straight across a 2" outlet into the pump. The entire hair and lint pot including the top, fastened by the two stainless steel 3/8" (16 threaded) large, star head bolts, shall be coated with Oxyplast Urethane powder coatings, for extreme durability. The Urethane coatings shall be high impact, abrasive, chemical solvent, and salt resistant. A removable, large capacity, rubber coated, metal strainer basket shall be included.

F. Vacuum Head: Patented, 42" width, Polyethylene plastic, contouring, surface conforming, vacuum head with three, 1 1/2" intake points that go into one manifold with a 2" outlet, including a stainless steel pole adapting snap handle, and standard wheels, with a 1" adjustability.

G. Power: Electric 2 horsepower, 110 volt / 30 amp single phase. One (1) Hubbell 2610 30A Nema receptacle included. (Requires dedicated 30 amp circuit).

H. Warranty: one year. (Excluding hoses and poles)

I. Accessories: Provide two (2) 12' x 23' telescopic poles that connect with each other with a slide-on riveted cam and a 2" x 50' heavy-duty vacuum hose.

2.8 WALL BRUSH

A. Heavy duty 24" wide brush with two rows of 1-1/2" black nylon bristles on a 16' single piece anodized aluminum pole and heavy duty stainless steel wall hooks and fasteners for hanging. Pentair #R111342/#R191116 or equivalent, (1) unit required.

2.9 POOL WATER TESTING KIT – PHOTOMETRIC

A. A pool water chemistry test kit shall be provided that utilizes a photometric sensing device featuring solid-state digital electronics to precisely measure and digitally display free and total chlorine, bromine, ozone, pH, alkalinity, calcium hardness, cyanuric acid, and copper. Test kit shall be a PalinTest Poolwater 9.

B. The test instrument shall show direct digital readings in an alphanumeric display that can be programmed to read in either English, Spanish, French, German, or international symbols (a). Photometer shall utilize two (2) built in filters, 520 and 570 ± 20m and include an automatic blank setting. Unit shall operate on 9-volt DC, be powered by (6) 1.5-volt AA batteries, and include an automatic shut-off to extend battery life.

1. Results should be able to be displayed as myll or ppm.

C. Test instrument shall utilize sealed dry tablet reagents for all test parameters. DPD reagent tablets shall be EPA approved and phenol red tablets shall contain enough buffering agent to neutralize up to (25) ppm of chlorine in pH test sample. Kit shall include starter set of reagent tablets for all tests and be provided in an impact resistant carrying/storage case.

2.10 UNDERWATER LIGHTS

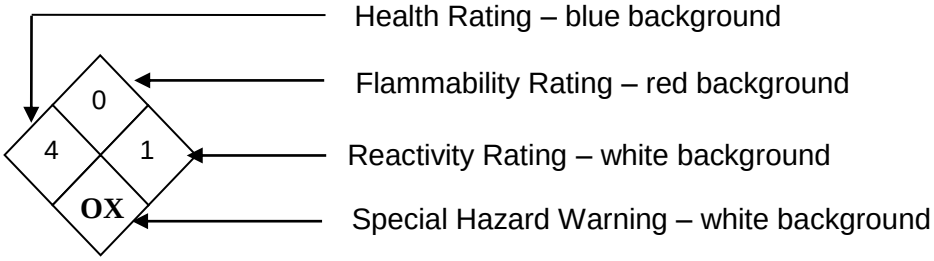
A. Manufacturer: Pentair Intellibrite Color LED Commercial Underwater Pool light or J&J Electronics Color Splash. 120VAC

B. Lights, niches and face ring of 300 Series stainless steel, with water stop on niche. Pool lights shall be UL listed, 500 watt equivalent light output, 120 volts, with three No. 16 conductors and waterproof cords of required lengths. Underwater lights shall conform to NEC Article 680-20.

2.11 SIGNS

A. Provide plastic signs either printed, silk screened, or engraved into a contrasting color plastic core. Typewritten letters are not acceptable. All letters and numbers shall be at least 4 inches high unless otherwise specified. Provide a good contrast between the letters and background, and correct typographical arrangement of the text. With the exception of engraved type signs, permanently protect the lettered surface by hermetically, thermally, or vacuum sealing into a monolithic plastic laminate of minimum 1/8" total thickness. Equip with p roper holes for mounting on wall with stainless steel screws and finishing washers. Provide bold strode modern Helvetica type style. Install signs where shown or directed.

1. Chlorine Gas Leak Sign: Provide sign with text as indicated. Letters shall be 1/2" high for main headings and 1/4" high for text.
2. Chlorine Warning Sign: Locate outside Chlorine Room on door as directed. Provide sign with 4" high text reading "DANGER GASEOUS OXIDIZER CHLORINE".
3. Ozone Warning Sign: Locate outside Equipment Room on door as directed. Provide sign with 4" high text reading "DANGER GASEOUS OXIDIZER OZONE".
4. Chlorine Cylinder Replacement Sign: Provide sign with text as indicated. Letters shall be 1/2" high for main headings and 1/4" high for text.
5. Chemical Storage Room Hazardous Material Signage: Provide signs on all doors leading to chemical storage rooms as indicated:



Signs shall be sizes and colors per code, mounted 60” A.F.F. on doors leading to Chemical Storage Rooms.
Numbers should depict highest hazard rating for all chemicals stored as applicable.

HAZARDOUS INFORMATION SIGNAGE

6. Occupancy Load Sign: Provide sign with 4" high letters indicating number of bathers allowed in each Pool and Spa.
7. Emergency Phone Number Sign: Provide a sign 18" x 24" minimum where clearly visible from deck with ambulance, fire, and police numbers, and the name and street address of the pool facility.
8. Artificial Respiration Sign: Provide sign 18" x 24" minimum with diagrammatic illustrations of artificial respiration procedures posted where clearly visible from deck.

9. Warning - No Lifeguard On Duty Sign: Where no lifeguard service is provided post sign with 4" high letters minimum. In addition the sign shall also state "Children under the age of 14 should not use pool without an adult in attendance" in 1" high letters.
10. No Diving Allowed Sign: Provide a sign 18" x 24" minimum with clearly legible letters not less than 4" high.
11. Warning Sign for Spa: Provide sign 18" x 24" minimum located near spa entrance with text at least 1" high as indicated:

CAUTION

1. Elderly persons, pregnant women, infants and those with health conditions requiring medical care should consult a physician before entering a spa.
2. Unsupervised use by children under the age of 14 is prohibited.
3. Hot water immersion while under the influence of alcohol, narcotics, drugs, or medicines may lead to serious consequences and is not recommended.
4. Do not use alone.
5. Long exposure may result in nausea, dizziness or fainting.

12. Provide a sign near the spa emergency shot off switch with 1" high letters to read as follows: "SPA EMERGENCY SHUT-OFF SWITCH".
13. Provide a sign conspicuously located near the entrance to the pool deck with minimum 1" high letters to read as follows: "SHOULD YOU REQUIRE THE USE OF A LIFT DEVICE TO GAIN POOL ACCESS PLEASE CONTACT THE POOL OFFICE OR ANY LIFEGUARD".
14. Provide DIARRHEA NOTICE SIGN 1" high letters in a Language or Diagram that clearly states shall be posted at the entrance area of the public pool which states: " Persons having currently active Diarrhea or who have had Active Diarrhea in the last 14 days shall not be allowed in the pool."
15. Provide signs on the exterior side of all doors and gates leading directly to the pool stating, "KEEP CLOSED."
16. If the pool is constructed without lighting, provide a sign on the exterior side of each entrance stating, "NO USE OF POOL ALLOWED AFTER DARK."

2.12 SAFETY EQUIPMENT

A. Ring Buoy: US Coast Guard approved 24" O.D. solid closed cell plastic with white vinyl coating and rigging. Provide each buoy with a heavy-duty 1/4" polypropylene floating throw line 60' in length, with a "lemon foot" attachment to anchor the line, and heavy duty stainless steel wall hooks and fasteners for hanging buoy and rope. (2) units required.

B. Body Hook: Heavy-duty anodized aluminum double crook hook with 16' single piece 042" wall anodized aluminum pole and heavy duty stainless steel wall hooks and fasteners for hanging. (2) units required.

C. Safety Rope: 3/4" diameter blue/white polypropylene rope with chrome plated bronze end hooks and locking 5" x 9" blue/white polyethylene floats spaced at 4' maximum, Spectrum #57420, (1) unit required, specified length.

D. Rescue tube: Ensolite foam covered with extra heavy duty red-vinyl, American Red Cross specified with brass buckle and "D" ring, poly tow line with 2" shoulder loop and reach assistant, quantity (2).

E. Spine Board: CJ Spine Board with "L" bracket head immobilizer with foam pads and velcro strap, 4 velcro body straps, and x-ray translucent, quantity (1).

F. First Aid Kit: 36-Unit First Aid Kit meeting ANSI Z308.1-2009 standards, quantity (1).

G. Emergency Blanket: Permanently mothproof with whip stitched ends, 60" x 84", quantity (2).

PART 3 - EXECUTION

3.1 INSTALLATION

A. As shown on Drawings, specified, and in accordance with the approved submittals. Anchor units securely with corrosion-resistant fasteners of size and type indicated and specified.

3.2 WELDING

A. Welds shall be ground smooth and polished. All welding shall be done by heli-arc method by certified welders using electrodes of same alloy as metal being welded and methods that prevent carbon pick-up in stainless steel.

3.3 BONDING

A. All concrete embedded metallic fixtures in the pool shell and in the deck within 5 feet of the pool wall shall be bonded together. Bond with #8 copper conductor and copper pressure connectors. Items include, but are not limited to: anchors, grates, sockets, and light niches.

3.4 UNDERWATER LIGHTS

A. Verify electrical loads and include in submittals. Grounding and bonding of underwater lights shall conform to NEC Article 680-20. Each light shall be tested and verified with a GFI tester, prior to filling the pool.

END OF SECTION

SECTION 131160

SWIMMING POOL ELECTRICAL

PART 1 - GENERAL

1.1 REFERENCE

A. Drawings and general provisions of Contract, including General and Supplementary conditions and Division 1, Specifications section, apply to this section.

1.2 DESCRIPTION

A. Provide all labor, material, tools and equipment required to complete the electrical work shown on the drawings and specified herein. A brief outline of the work requirements includes, but is not limited to, the following:

B. No extra work shall be undertaken without written approval of the Owner.

1.3 SUBSTITUTIONS

A. Catalog and manufacturer's number in this Section and on the drawings are for the purpose of establishing standards of quality and types of materials to be used. All manufacturer's names are assumed to be followed by, "or approved equal". Products of other manufacturers may be used if similar and if, in the opinion of the Engineer or Architect, Owner, equal in quality and design, and are specifically approved by the Engineer, Architect, Owner in writing.

1.4 QUALITY ASSURANCE

A. Material and equipment furnished shall be new and of the best quality. All items of a similar purpose shall be by the same manufacturer. Material shall be currently listed and approved by Underwriters Laboratories and shall bear Inspection Labels where inspection standards have been established. Where industry or trade standards are in force, furnished material or equipment shall comply with these standards as a minimum criteria of quality and workmanship. Equipment and material shall comply with local governmental, trade and industry standards. Material shall be delivered to the job site in original unbroken packages, bundles and cartons, as received from manufacturer or wholesaler.

B. REFERENCE STANDARDS: Various codes, specifications and standards are referred to throughout these specifications and indexed by number. In most cases, the year designation has been deleted; it is expected that the material or methods specified shall conform to the latest adopted current code, specification or standard of the designated index number. Tentative standards shall be construed as current unless otherwise noted.

C. Underwriter Laboratories, INC. (U.L)

1	Flexible Steel Conduit
6	Rigid Metallic Conduit
20	Snap Switches
50	Cabinets and Boxes
83	Thermoplastic Insulated Wires
98	Enclosed Switches
467	Grounding and Bonding Equipment
486	Wire Connectors and Soldering Lugs, Electric
510	Insulating Tape
514	Outlet Boxes and Fittings
651	Electrical Rigid Nonmetallic Conduit
797	Electrical Metallic Tubing
943	Ground- Fault Circuit Interrupters
1241	Junction Boxes for Swimming Pool Lighting Fixtures

D. National Electrical Manufacturers Association (NEMA)
AB-1 Molded Case Circuit Breakers
ICS-1 Industrial Control and Systems
PB-1 Panelboards and Distribution Switchboards
ST-20 Dry-type Transformers for General Application
TC-3 PVC Fitting for Use with Rigid PVC Conduit and Tubing
TC-6 PVC and ABS Plastic Utilities Duct for Underground Installations
TC-10 PVC and ABS Plastic Communications Duct and Fittings for Underground Installation
WD-1 General Wiring Devices

E. American National Standards Institute (ANSI) Z35.1– Specifications for Accident Prevention Signs

F. National Fire Protection Association (NFPA) 70 - 2013 California Electrical Code (NEC)

G. All electrical work shall be done in strict compliance with the 2013 California Electrical Code. The contractor shall obtain and pay for all required permits.

1.5 SUBMITTALS

A. The following information shall be submitted for review prior to the incorporation of any such material or equipment in the project.

B. Catalog Cuts
1. Furnish seven (7) copies each item - above.
a. Snap Switches
b. Enclosed Switches
c. Swimming Pool Junction Boxes
d. Lighting Control Panel

C. CERTIFICATES
1. Certification (seven (7) copies of each):
a. Certification of Transformer Manufacturer Tests (60 Hz)

1.6 DRAWINGS

A. The drawings are diagrammatic and shall not be scaled for exact locations. Field conditions, non-interference with other utilities or trades, and architectural, structural and mechanical features shall determine exact locations.

1.7 EXAMINATION OF THE SITE

A. The Contractor shall examine the site and building area where the work is to be performed. By submitting a bid on the work, he shall be deemed to have accepted the site conditions.

1.8 PERMIT

A. This Contractor shall obtain and pay for the required electrical permit.

1.9 RECORD DRAWINGS

A. The Contractor shall maintain, on the job, a set of prints on which all changes in location or runs shall be carefully indicated. At the conclusion of the project, these prints shall be delivered to the Engineer, Architect, and Owner.

B. Record drawings shall be kept in accordance with the appropriate sections of the General or Special Conditions of the Specifications.

1.10 ELECTRIC SERVICE

A. The building will be served from the Owners (4800 volt) (4160 volt) distribution system. Accomplish connections as indicated.

1.11 TEMPORARY UTILITIES

A. The Contractor may use the power and water available in the building for lighting and small hand tools. Toilet facilities in the building may be used by contractor personnel.

1.12 COOPERATION

A. The Electrical Contractor shall cooperate fully with the other trades involved and coordinate his work with the work of other trades.

1.13 BARRICADES

A. Furnish proper barricades at all excavations. Barriers shall be lighted.

1.14 CUTTING AND PATCHING

A. All cutting and patching required by the installation of the electrical work shall be done by this Contractor. Do not cut or drill structural members without written permission of the Structural Engineer.

1.15 MATERIAL AND EQUIPMENT

A. Materials and equipment furnished under this Section of the Specifications shall be standard products of manufacturers regularly engaged in the manufacture of such products, and shall be the manufacturer's latest standard design that complies with the Specifications' requirements.

1.16 PROTECTION

A. Protect all work, materials and equipment from damage from any cause, and provide adequate and proper storage facilities during the progress of the work. Provide for the safety and good conditions of all work until final acceptance of the work, and replace all damaged or defective work, materials and equipment before requesting final payment.

1.17 CLEAN-UP

A. This Contractor shall clean all trash and debris from the site and building area which has been caused as a result of the electrical construction.

1.18 GUARANTEE

A. All material and equipment furnished and installed under this Section shall be guaranteed by the Contractor for a period of one (1) year from the date of acceptance of the work. Should any trouble develop during this period, due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and materials to correct the trouble at no additional cost to the Owners.

PART 2 - MATERIALS AND EQUIPMENT

2.1 CONDUIT

A. Rigid Metal Conduit shall be rigid steel conduit conforming to U.L. Standard 6.

B. Electrical Metallic Tubing (EMT) shall conform to U.L. Standard 797.

C. Flexible Metal Conduit shall conform to U.L. Standard 1 (for dry areas indoors).

D. Electrical plastic conduit shall be made of PVC Schedule 80, as called for, and shall conform to NEMA TC-2 with fittings conforming to NEMA TC-3.

E. Plastic utilities duct for underground use shall be of PVC materials; conforming to NEMA TC-6.

F. Liquid tight flexible conduit shall be listed by Underwriters Laboratories, Inc., and shall bear their listing mark.

G. Flexible Metal Conduit, boxes and fittings for hazardous area shall conform to U.L. Standard 886.

H. Fittings, boxes, covers and outlets for conduit system shall conform to the following specifications:
   1. Fittings for outdoor work and exposed indoor work shall be of cast or malleable iron or cast aluminum, and shall have threaded hubs.
   2. Fittings for rigid metallic conduit and electrical Tubing shall conform to U.L. Standard 514. Rigid conduit shall be used with threaded fittings only. Split couplings are not acceptable.

3. Fittings for electrical metallic tubing (EMT) for sizes 3/8" through 1" shall be either "drive-on," "push-on" or wrench tightened compression type which shall provide pull-on force resistance and electrical continuity as required by U.L. Standard 514. Drive-on fittings shall contain grips which engage the conduits as the fitting is forced on. No indenting fittings or adjustable set screw type fittings shall be used. Fittings for EMT larger than 1" shall be compression type.
4. Fittings for flexible metal conduit shall conform to U.L. Standard 514B and shall be cadmium or zinc coated.
5. Cast metal conduit outlets shall conform to U.L. Standard 514B and shall be cadmium or zinc coated if of ferrous metal. Cast boxes shall be the size required for the conduits entering.
6. Junction boxes and covers shall conform to U.L. Standard 514A (for non-hazardous areas). Boxes shall be 4" square by 1-1/2" deep or larger if required by the number of wires or conduits entering.

2.2 WIRES AND CABLES

A. Conductors shall be copper. The cable and conduit sizing indicated or specified is for copper. Insulated wires and cables manufactured more than six (6) months prior to date of delivery to the site shall not be used.

B. For service to 600 volts and below, wires and cables shall have 600 volts insulation and shall conform to U.L. Standard 83. Wires and cables shall be type THW or THWN. Conductor sizes shall be as indicated. Where sizes are not indicated, they shall be No. 12 AWG minimum. All wiring shall be color coded for phase identification.

C. Grounding Conductors shall be soft drawn bare copper, or insulated copper wire as indicated, with green colored insulation or green plastic identification bands. Grounding bonding equipment shall conform to U.L. Standard 467.

D. Connectors and Terminals conforming to U.L. Standard 486 shall be designated for use with the specific associated conductor material, and shall provide uniform compression over the entire contact surface. Terminal lugs shall be used on all standard conductors.

E. Electrical Tapes used for electrical insulation and other purposes in wire and cable splices, terminations, repairs and miscellaneous purposes shall conform to the requirements of U.L. Standard 510.

F. Signal and miscellaneous control wire, use 600 V, U.L. designation type THW, unless otherwise specified.

G. Use OZ Mfg. Co., Type "B" insulated bushings at all locations where #1 wire or larger enters or leaves equipment boxes.

2.3 OUTLET BOXES

A. Outlet boxes for concealed work shall be galvanized or sherardized, one piece, pressed steel, knockout type.

B. Light outlet shall be 4" octagon, 4" square or larger box depending upon the number of wires or conduits therein, and shall be equipped with 3/8" malleable iron fixture stud, and plaster ring. Plaster ring shall have 3" round opening with two (2) tapped mounting ears.

C. Switch outlets shall be 4" square box for single-gang, 5" square box for two (2) gang, and special one (1) piece gang box for more than two (2) switches with plaster ring for mounting switch or pilot light.

D. Receptacles, outlet shall be 4" square, or larger box depending upon the number or wires or conduits therein, with single gang or larger plaster ring to suit the device installed. Where special box is specified herein or otherwise required for a particular device, same shall be furnished.

E. Swimming Pool Junction boxes above deck or in remote wall mounting shall be cast bronze with integral ground lugs, hubs and neoprene gasket. Strain relief must be provided for light fixture.

2.4 RECEPTACLES

A. Receptacles shall be the automatic self-grounding type and shall conform to NEMA WD-1. Unless otherwise indicated, configuration shall be 5-15R. Receptacle cover plates shall comply with U.L. Standard 514 and shall be of [stainless steel .040"]. Receptacles shall be specification grade.

2.5 RELAYS

A. All relays shall be Cutler Hammer Type 9575, Allen Bradley Bulletin #700 Type D, or Square "D" Type 8501 except for lighting control or as otherwise indicated on the drawings. All relays for control lighting circuits shall be mechanically held with coil for three (3) wire operation, ASCO #917, Zenith Series MSC or equal.

2.6 TERMINAL CABINETS

A. Furnish and install where shown on the plans, flush steel cabinets with hinged door for each section, equipped with lock and key. Key shall match those of panelboards.

B. Furnish terminal strips in all sections except telephone. Terminal strips shall be stud type with sufficient pairs of terminals for all conductors, plus 10% spares.

C. Wireway and gutters. Where indicated on drawings, approved metal wireways shall be furnished complete with necessary complement of fittings connectors and accessory parts. Wireway shall be of the "lay-in" type with standard knockouts and with screw covers for full channel access. Wireway cross-sectional dimensions shall be sized to accommodate all the wiring noted on the plans. All sheet metal parts shall be coated with a rust inhibitor and finished in baked enamel. Gutters used outdoors shall be NEMA 3R.

2.7 PULL BOXES

A. Furnish and install pull boxes where necessary in the raceway system to facilitate conductors installation. In general, conduit runs of more than 100' or more than three (3) right angle bends, shall have a pull box installed at a convenient intermediate location. All such boxes shall be indicated on the Contractor's shop drawings.

B. Pull boxes shall be made of galvanized steel in the equipment room and of a rust-proof stainless steel or bronze on the pool deck, of metal gauge and physical size as required by the NEC for the number and size of conduits and conductors involved. Boxes shall have removable screw covers for flush or surface installation as indicated on the plans.

C. Boxes shall be securely mounted to the building structure with supporting facilities independent of the conduits entering or leaving the boxes.

2.8 EXTERNALLY OPERATED SAFETY SWITCHES

A. Externally operated switches (EXO) or non-fused disconnect switches shall be heavy duty industrial type. Switches shall be fused or unfused as called for. NEMA standard type "HD" in NEMA I enclosures. Units shall be quick-make, quick-break with operating handle which can be padlocked in the "OFF" position. Finish shall be standard light gray enamel. Switches shown exposed to the weather shall have NEMA 3R enclosures. Switches shall have affixed to covers, a nameplate indicating what item is controlled by switch. Switches shall comply with U.L. Standard 98.

B. Fuses shall be of the proper current rating for each installation, and shall be of the following classes:
   1. Current limiting fuses shall be as manufactured by Bussman Mfg. Co., "Limitron"; "Trionic" as manufactured by Chase-Shawmut Co.; KNLR/KLSR as manufactured by Littelfuse Tracor, or equivalent.
   2. Multi-element time-delay current limiting fuses shall be "Fusetrons" as manufactured by Bussman Mfg. Col; "Trionic" as manufactured by Chase-Shawmut Co.; "Slo-Blo" as manufactured by Littelfuse Tracor, or equivalent.

2.9 SUPPORT BUSHINGS

A. Shall have bodies of malleable iron casting, hot dip galvanized, with insulated inner surface and wedging plug of an insulating material.

2.10 SEALING MATERIAL

A. Shall be a two-part urethane foam which when mixed will expand approximately 15 times in volume to form a dense, strong tough foam unit with a density of 3 to 4 pounds per cubic foot. It shall reach 60% full strength in 8 to 10 minutes after application.

2.11 PENETRATION SEALING SYSTEMS (FIRE STOPS)

A. Provide cable and raceway penetration sealant meeting UL and ASTM standards and NEC Article 300-21. Sealant shall not rely on heat to expand and seal the penetration. Sealant shall remain pliable and vibration-proof to prevent cracks or sprawl and shall not break seal due to vibration of cable and raceways. The fire rating of the sealant shall equal or exceed the fire rating of the penetrated materials (1 hour minimum at corridor walls; 2 hours minimum at shafts and chases). Sealant shall be Chase Tech. Corp CTC PR-855, 3M Type CP-25 or equivalent.

2.12 CONCRETE

A. Concrete for duct encasement, pad and such shall be 4500 pound tested at 28 days.

B. Concrete for duct encasement, pad and such shall be specified under the Concrete Section of this Specification.

2.13 GROUND RODS

A. Ground rods shall be copper clad steel. Install ground rods as called for on the drawings, but in no case smaller than 3/4" diameter by 10 feet long.

2.14 PULL LINE

A. Pull line shall be nylon or other man made fiber with a tensile strength of not less than 200 pounds.

PART 3 - EXECUTION

3.1 LAYOUT AND INSTALLATION

A. Layout and installation of electrical work shall be coordinated with the overall construction schedule and work schedules of various trades, to prevent delay in completion of the project. Complete drawings and specifications for the entire project will be available at the job site. It shall be obligatory to thoroughly check these documents before organizing the electrical work schedule or installing material and equipment.

B. Electrical equipment, outlets, junction and pull boxes shall be installed in accessible locations, avoiding obstructions, preserving headroom and keeping openings and passageways clear. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect functioning of the equipment.

C. Sleeves for electrical conduit passing through walls or slabs shall be placed under the work of this Section before concrete is poured. Where conduits pass through suspended floor slabs, sleeves shall be standard weight, galvanized steel pipe extending 2" above finished floor level. Sleeves at other locations shall be either light weight galvanized steel pipe or galvanized sheet steel. Clearance between conduit and sleeves shall be not less than 1/2". Sleeves through outside walls, below grade shall be caulked tight with oakum and the ends sealed with an approved semi-plastic coat tar base compound, or shall be of the stuffing-box type. Other sleeves shall be packed with glass wool, ends sealed with Duct-Seal, and covered with metal escutcheon plates. Conduits passing through floor slabs at grade level will not require sleeves, and shall be placed with tops of couplings at floor level. Wherever conduits pass through roof or outer walls, piercing the waterproofing, base flashing and counter flashing shall be provided under this Section to maintain waterproofing seal.

D. Install fire stops where shown on the drawings and wherever cables and raceways penetrate fire-rated walls, floors, ceilings, roofs or structures. Provide fire stops to seal all penetrations below equipment where conduits and conductors enter. Installation shall be in full accordance with the manufacturer's instructions, NEC and local fire codes.

E. No holes or sleeves for conduits or equipment shall be allowed to remove or pierce any structural members, including walls, floors, columns, beams, footings, etc., without previous written consent of the responsible Structural Engineer or Architect, or such provisions are properly made under the direction of such responsible authority.

F. Any cutting, patching, or finish repair of the work, or work of other trades necessary for the installation of the electrical work shall be provided under this Section.

G. Anchor bolts and inserts shall be galvanized and of adequate size and strength for installation of electrical work, shall be placed in forms before concrete is poured.

3.2 CONDUIT

A. Conduit for wiring 120 volts and over shall be PVC coated rigid steel. Conduit shall be concealed within finished walls, ceiling and floors where possible. Exposed conduit and conduit above suspended ceiling with removable panels, shall be installed parallel with or at right angles to the building walls. All conduit shall be supported adequately by one (1) hole malleable iron straps or pipe hangers. When the area ceiling is suspended type, conduit shall be above the ceiling. Conduit larger than 1", in reinforced concrete slabs, shall be parallel with or at right angles to main reinforcement. When at right angles to the reinforcement, the conduit shall be close to one of the support saddles. Conduit in concrete shall be located so as not to affect the structural strength of the slab, but so that the conduit shall be surrounded by a minimum of 1" of concrete. Where embedded conduit crosses expansion joints, suitable weather tight expansion fittings and bonding jumpers shall be provided. Conduit installed beneath floor slabs shall be encased in concrete. The concrete encasement surrounding the conduit shall be rectangular in cross-section and have a minimum concrete thickness of 3". Where two or more conduits are encased together, they shall separated by a minimum concrete thickness of 1-1/2", except that light and power conduits shall be separated from control signal and telephone conduits by a minimum concrete thickness of 4". The top of the concrete envelope shall be directly under the floor slab.

B. Conduit encased in concrete shall be PVC coated rigid galvanized steel.

C. Aluminum conduit shall not be installed underground or encased in concrete, and shall not be used with brass or bronze boxes or fittings.

D. Electrical metallic tubing (EMT) shall not be installed underground, encased in concrete, installed in hazardous areas, or used in outdoor work. Maximum size of EMT shall be 2" in diameter.

E. Exposed conduit subject to physical damage shall be PVC Coated rigid standard weight galvanized steel conduit. The definition of "exposed to physical damage" used herein is any conduit run vertically or horizontally below 8' above the finished floor.

F. Conduit for underground service into building shall be rigid galvanized steel from the service equipment to a point 5 feet beyond the building. The underground portion of the conduit shall be encased in a concrete envelope having a wall thickness of not less than 3". Where a conduit rises through a concrete floor, the curved portion shall not be visible above the finished floor and the entire conduit below the floor slab shall be encased in a concrete envelope having a wall thickness of not less than 3".

G. Conduit extending 5' beyond the building line to remote locations may be rigid steel or PVC, fiberglass or utility duct, either PVC or ABS and shall be encased in 3" of concrete.

H. Flexible metal conduit shall be used for final connection to rotating or vibrating equipment. A green insulated equipment grounding conductor shall be installed in such conduits. Liquid-tight flex shall be used in damp or wet locations requiring flexible connections.

I. Conduit runs of flexible metal conduit or all runs, any portion of which is flexible metal conduit shall have a green ground conductor, pulled in with the circuit wires.

J. All runs where non-metallic conduit is used shall have a proper ground conductor installed.

K. In all cases, where a ground conductor is installed, it shall be the Contractor's responsibility to install conduit of sufficient size to accommodate the ground conductor and specified phase wires. The ground conductor shall be sized to meet code requirements.

L. Telephone and Ethernet conduit system shall include outlets and backboards interconnected with conduit as indicated. Install a pull cord in all empty conduits. Telephone conduits shall be EMT or PVC where not installed in plenums.

M. Sound reinforcement system shall include outlet terminal cabinets as indicated on the drawing. Sound system wiring components and connections shall be installed in accordance with the specification for such systems. Install a pull cord in all empty conduits. Conduit shall be EMT.

N. Install expansion provisions in all conduits crossing expansion joints and at all locations noted. Use U.L. approved fittings for all conduits larger than 1-1/2" in furred spaces and for all size conduits in concrete slabs. In conduit runs 1/2" through 1-1/2" length of flex installed in the run at the expansion joint may be used. For conduits which do not contain a grounding conductor, a green colored insulated wire shall with slack equivalent to the expansion of the joint shall be mounted across the expansion joint.All concrete embedded metallic fixtures in the pool shell and in the deck within 5 feet of the pool wall shall be bonded together. Bond with #8 copper conductor and copper pressure connectors. Items include, but are not limited to: anchors, grates, sockets, and light niches.

3.3 WIRE AND CABLE

A. Wire and cable shall be continuous from outlet to outlet, with the splices only in junction boxes, gutters and equipment.

B. Support Cable No. 1 and larger in vertical run of over 20' in total rise. Where any cable rise vertically, include cable supports where, and as required by code.

C. Signal and miscellaneous control wire, use 600V. U.L. designation type THW unless otherwise specified.

D. Splices. All splices shall be in accessible locations. Tapes shall be as specified hereinbefore. The conductor shall be joined securely both mechanically and electrically by twisting the conductors together and soldering, or by the use of solderless connectors. For splices in Wire No. 10, AWG and smaller, the conductors shall be twisted together and soldered and then covered neatly with an insulation equivalent in value to the conductor insulation or for branch circuits under 600 volts, the splice may be made with approved solderless connectors and then shall be covered neatly with insulating tapes, hot molded composition covers, or other approved equivalent, conductor insulations.

3.4 GROUNDING

A. Grounding shall be in accordance with the National Electrical Code, except that water piping shall be grounded, but shall not be used as the grounding electrode. Grounds and grounding systems shall have a resistance of solid earth ground not exceeding the following values:

OHMS < 25ohms

For grounding secondary neutral noncurrent metal parts associated with electrical equipment and for grounds not covered above.

B. Minimum size of grounding conductor from ground rods to service equipment shall be No. 4 AWG and connected to the ground rod using a copper jumper, full size of the grounding conductor.

C. Grounding connections shall be made by exothermic welds or by brazing a compatible mechanical connector and brazing over completely. Exothermic welds shall be made strictly in accordance with the manufacturer's written recommendations. Exothermic welds which have "puffed up" or which show convex surfaces, indicating improper cleaning or the attachment surface are not acceptable. No mechanical connectors are required at exothermic weldments.

D. Grounding contacts of receptacles shall be connected to a solidly grounded equipment grounding conductor. The resistance between the equipment grounding contacts and solid earth ground shall not exceed 25 ohms.

3.5 INSTALLATION AND SUPPORT OF BOXES

A. Concealed outlet boxes shall be accurately placed so as to finish flush with the finish surface or wall or ceiling unless otherwise indicated. They shall be plumb and rigidly fastened to the structure, independent of the conduit, by a bar hanger or strap approved for each particular use.

B. Outlet, pull or junction boxes where mounted on concrete, brick, etc., shall be rigidly fastened by proper sized machine bolts and approved type expansive shield.

C. Outlet boxes in furred ceilings shall be rigidly fastened to the supporting structure by an approved type bar hanger or other device.

D. Heights or outlets and equipment indicated on the drawings shall govern, but in the absence of such indication, the following heights above finished floor shall be maintained. Outlet heights are centerline:

Switch	48”
Receptacles	12” or as indicated on plans

3.6 PULL BOXES

A. Boxes shall be securely mounted to the building structure with supporting facilities independent of the conduits entering or leaving the box.

3.7 CONNECTION TO EQUIPMENT

A. Contractor shall connect all equipment throughout building requiring electrical connections.

3.8 ENCLOSURE

A. Relays or contactors indicated on plan to be installed exterior to panelboard or motor control center shall be mounted in NEMA-1 enclosures indoors and in NEMA 3R enclosures where exposed to weather.

3.9 FINISH

A. All panelboards, relay and terminal cabinets shall be finished light gray baked enamel ANSI-49 over all steel surfaces. Panelboards installed flush in corridor walls or other public spaces shall be finished prime coat on exposed trim and door. Final finish will be determined by Architect.

3.10 ENGRAVING AND MARKING

A. In addition to nameplates required for governing codes for switchboards, panelboards, transformers, etc., control devices switches, circuit breakers, starters, relays, etc. shall be labeled to indicate function or use.

B. Control devices on switchboards, distribution panels or motor control centers shall have engraved nameplates, attached with rivets or drive screws.

C. Circuits on panelboards shall be labeled with a typed directory mounted in a holder provided on inside, or embossed plastic strip type adhesive labels mounted adjacent to control devices.

D. Individual disconnect switches, circuit breakers and motor starters in finished areas on interior or exterior of building shall have engraved nameplates. Control devices in mechanical rooms may be labeled by means of paint stenciling with a contrasting paint color. Stencil figures shall be 3/8" high unless otherwise required.

E. Flush mounted control devices with stainless steel or plastic plates shall have plate engraved with 3/16" high block type characters filled with black enamel.

F. Attached engraved nameplates shall be of laminated black and white nameplate stock with 3/16" high characters cut through the black exposing the white. Plates shall have beveled edges.

3.11 CONTRACTOR DAMAGE

A. The Contractor shall promptly cause repairs to be made on any utility lines. Lines which are shown as existing on the drawings shall be repaired at the Contractor's expense.

3.12 RECONDITIONING OF SURFACES

A. All surfaces disturbed shall be replaced in kind. Reseeding or replanting will not be required. Paving repair shall be as specified in another Section of these Specifications.

3.13 BARRICADES

A. Barricades shall be placed at all open ditches and other obstructions. Barricades shall be Lighted at night.

3.14 TESTS

A. After installation has been completed and the Inspector of Construction has been given 5 days notice of the proposed test, the Contractor shall conduct an operating test. All equipment and devices shall be demonstrated to operate in accordance with the specifications' requirements. Test equipment shall be furnished by the Contractor and records shall be made of the test results. Test results shall be submitted for record purposes.

B. All electrical tests shall be witnessed by an inspector. The inspector shall have experience in electrical work equal to that of an electrician having at least five year experience as a Journeyman.

C. Before any wire is connected to the ground rods, each rod shall be tested for ground resistance value with a portable ground testing meter developing an AC voltage and shall be used to test each ground or group of grounds. The auxiliary or reference ground rods shall be 3/4 inch copper clad steel, not less than 4 feet in length and driven 3-1/2 feet deep and shall be installed in a straight line from the ground being tested and the two reference grounds and to the proper binding post of the instrument. Where there is more than one ground within a circle of 10 feet at a particular location, the reference rods as driven for the "first" test shall be used for tests on the other rods without changing their location. The instrument shall be equipped with a meter reading directly in ohms and fractions thereof indicating the ground value in ohms of the ground under test.

D. Installation 600 volts and less shall be tested to determine that the wiring system and equipment is free from short circuits and from ground other than required grounds. Tests shall be made with an instrument capable of accurate resistance measurement and having a voltage rating of not less than 500 volts.

3.15 ANCHORS

A. Dry transformers shall be anchored to the floor with manufacture recommended bolts and tied to wall studs, concrete or masonry walls with 2" channel or flat iron stock, both sides.

3.16 PROTECTION OF WORK

A. The Contractor shall protect all work, materials and equipment from damage from any cause whatsoever, provide adequate and proper storage facilities during progress of work, and be fully responsible for all injury or damage due to any part of his work function.

3.17 ADJUSTMENTS

A. Adjust all relays, contactors and controls to properly operate, interlock, and sequence. Adjust contact clearances with alignment. Tighten loose bolts or screws. Properly select and set all protective elements and devices.

3.18 ACCEPTANCE

A. Before this work will be accepted, the Contractor shall demonstrate to the Owner that the entire installation is complete, in proper operation and adjustment with all new materials, and that the Contract has been fully executed.

3.19 GALVANIZED SURFACES

A. Brush thoroughly and wipe with clean rags and solvent to remove all dirt, oil and grease.

3.20 PANELBOARDS

A. Panelboards and similar items with factory finish. Clean and touch up damaged surfaces.

3.21 CLEAN UP

A. Upon completion of work, and periodically as required for safety and sanitation, remove from the site all surplus material, equipment and debris resulting from work under this Section.

END OF SECTION

SECTION 134815

SOUND ISOLATING FLOATING FLOORS

PART 1 - GENERAL

1.1 RELATED WORK

A. Requirements: Provide sound and vibration isolated floors in accordance with Contract Documents.

B. Related Sections
   1. Section 033000 - Cast-In-Place Concrete.
   2. Section 033500 - Concrete Sealers.

1.2 SUBMITTALS

A. General: Submit the following in accordance with Section 01300 - Submittals.

B. Product Data: Each type of isolation material.

C. Shop Drawings: Lay out drawings indicating floating concrete floor reinforcement and jack-up mount locations.

D. Isolators load and deflection curves.

E. Acoustical test data from independent laboratory showing minimum STC improvement of 16 and minimum INR improvement of 40 using 4 inch concrete floor and 1 inch air gap.

F. Floating floor structural test data with specified or lesser reinforcement.

1.3 QUALITY ASSURANCE

A. Set isolation materials and raise floating floor under isolation manufacturer's supervision.

B. Pre-Installation Conference: Prior to commencement of sound and vibration isolation work, schedule meeting at mutually agreeable time to include Owner, Architect, Contractor, Contractor's field superintendent, sound and vibration isolation installer, materials manufacturer's representative, and other interested parties to review methods and procedures to be used to achieve end result.

1.4 DELIVERY AND STORAGE

A. Delivery: Deliver in manufacturer's unopened containers fully identified with manufacturer's name, trade name, type, class, grade, and size.

B. Storage: Store in unopened containers, off ground and protected from damage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Neoprene Jack-Up Mounts: Type FSN (Mason Industries, Inc.) or approved equal.

B. Angle Brackets: Type AB-716 Angle Bracket (Mason Industries, Inc.) or approved equal.

C. Perimeter Isolation Board: Type AFG-10 (Mason Industries, Inc.) or approved equal.

D. Plastic Sheeting: 6 mm thick plastic sheeting similar to visqueen.

E. Caulk: Non-hardening, non-drying and non-bleeding type.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, adjoining construction and condition under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.2 FLOATING CONCRETE FLOOR INSTALLATION

A. Preparation: Remove trash and vacuum clean substrate.

B. Set perimeter insulation board around walls and other vertical surfaces. Secure in place with adhesive.

C. Cover floor area with plastic sheeting. Extend up, over perimeter insulation. Lap seams minimum 3 inches and seal with waterproof tape.

D. Place neoprene jack-up mounts and reinforcing steel as indicated on reviewed Shop Drawings.

E. Pour concrete floating floor as specified in Section 033000 - Cast-In-Place Concrete. Level to within 1/8 inch in 10 feet tolerance.

F. Alter concrete has cured raise floor to height indicated. Caulk perimeter isolation board and seal jack-screw holes with grout.

END OF SECTION

DIVISION 14

CONVEYING EQUIPMENT

SECTION 142050

GENERAL ELEVATOR REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
1. Section 015000 - Temporary Facilities and Controls: Temporary use of elevators.
2. Section 055000 - Metal Fabrications: Sill support angles, hoisting beams, divider beams, and intermediate rail supports.
3. Section 055133 - Ladders: Pit Ladders.
4. Section 142100 - Electric Traction Elevators.
5. Section 142400 - Hydraulic Elevators.
6. Section 142750 - Elevator Cabs, Entrances, and Signals.
7. Section Division 28 - Detection and Alarm: Fire [and smoke] detectors.
8. Division 26 - Electrical - Electrical service and main disconnect switch in elevator machine room.

1.2 DEFINITIONS

A. Terms used within specification sections related to elevators are defined in CCR, Title 24, Part 7.

1.3 SYSTEM REQUIREMENTS

A. Design Requirements:
1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Contract Documents broadly outline performance features and equipment required, but do not cover details of design and construction of elevator equipment. Compliance with Contract Documents and requirements of local authorities is responsibility of manufacturer and installer.
3. Do not permit name plates or logos identifying manufacturer to be visible to general public.

B. Performance Requirements:
1. Speed:
   a. Traction Elevators: Plus or minus 5 percent under loading conditions.
   b. Hydraulic Elevators: Plus or minus10 percent under loading conditions.
2. Leveling: 1/4 inch under any loading condition.
3. Flight time: Not to exceed 6.0 seconds for electric elevators and 10.0 seconds for hydraulic elevators from time doors reach closed position until they start to open at next floor.
4. Door operation time:
   a. Time to open: Not to exceed 1.6 seconds for time necessary to open, measured from time doors start to open to time doors are fully open.
   b. Time to close: Not to exceed 2.5 seconds.
5. Standing time:
   a. Normal time doors remain open after stopping for demand: Separately adjustable for car on landing calls and capable of adjustment from 0 seconds to 10 seconds after doors reach fully open position.
   b. Initial adjustment: Set to 2.0 seconds for car call and 3.0 seconds for landing call.

C. Fire Resistance:
1. Treat wood components with fire-retardant treatment conforming to requirements of authorities having jurisdiction and to achieve flame spread rating of 25 or less when tested in accordance with ASTM E84.
2. Protect electric wiring with flame retardant and moisture resistant outer covering, run in conduit, tubing or electrical wireways.

D. Noise Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure and minimize noise from elevator system.

E. Interface With Security Systems:
   1. Coordinate elevator systems with requirements of security system specified in other Sections purchased under separate contract.
   2. Provide materials and assistance as necessary to coordinate and ensure proper operation of installations and systems.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data:
   1. Submit product data and environmental limitations for each item or component part for each elevator system.
   2. List and describe features of control system, performances, and operating characteristics.
   3. Include catalog cuts for manufacturer's standard signal and operating fixtures, operating panels, indicators, and other similar components.

C. Shop Drawings:
   1. Submit shop drawings of each elevator system.
   2. Include reference to Work of related trades.
   3. Indicate:
      a. Sections of each elevator shaft.
      b. Plan of each elevator machine room showing location and sizes of equipment and required clearances.
      c. Locations of equipment, including safety guards.
      d. Complete wiring diagrams of system circuits and controls.
      e. Elevations and detailed drawings of elevator cabs and hoistway entrances, including door details, frames, controls, fixtures and accessory equipment.
      f. Rail bracket spacing and maximum loads on guide rails.
      g. Reactions at points of support.
      h. Weights of principal components.
      i. Loads on hoisting beams and location of trolley beams.
      j. Expected heat dissipation of elevator equipment in machine room.
      k. Power configuration data, including horsepower, voltage and amperage requirements, starting current, full load running current, and demand factor for applicable motors.
      l. Cathodic protection requirements for hydraulic elevators.
      m. Seismic design data.
   4. Stamp shop drawings with seal and signature of professional engineer responsible for design.

D. Samples:
   1. Submit samples of finishes exposed to view; 8 inch squares of sheet materials and 12 inch lengths of running trim.
   2. Submit color charts for Architect's color selection of painted finishes designated as manufacturer's standard colors.
   3. Submit samples representing proposed finish in colors and sheen as directed by Architect for painted finishes designated as custom colors or colors to match samples furnished by Architect.

E. Informational Submittals: Submit the following
   1. Certifications specified in Quality Assurance article.
   2. Qualification Data: Manufacturer's, engineer's and installer's qualification data.
   3. Continuing Maintenance Agreement: Submit example of proposed maintenance program through Architect for Owner's review.

F. Closeout Submittals:
   1. Submit under provisions of Section 017800.

2. Operation and Maintenance Data: Submit manufacturer's printed, recommended operation and maintenance data.
   a. Include description of elevator system's method of operation and control, including door operation, signals, firefighter's service, emergency power operation, and other special or non- standard features required.
   b. Provide parts catalogs with complete list of equipment replacement parts with equipment description and identifying numbers.
   c. Provide legible schematic wiring diagrams covering electrical equipment installed, including changes made in final work, with symbols listed corresponding to identity or markings on both machine room and hoistway apparatus.
   d. Provide following maintenance details:
      1) Lubrication chart.
      2) Trouble shooting procedures.
      3) Adjustment techniques.
      4) Operating checks.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 5 years documented experience with work comparable to Work of this Project; either elevator manufacturer or licensee of manufacturer.

B. Maintenance Personnel Qualifications: Employees of elevator installer.

C. Regulatory Requirements:
   1. Comply with requirements of local authority having jurisdiction and any authority which may govern requirements for elevators.
   2. Comply with requirements of CCR, Title 24, Part 7; indicated herein as "Elevator Code."
   3. Comply with provisions of American with Disabilities Act (ADA), including ADA Accessibility Guidelines (ADAAG) and CCR, Title 24, Part 2for accommodating persons with disabilities.
   4. Comply with requirements of CCR, Title 24, Elevator Safety Requirements for Seismic Risk Zone 3 or Greater.

D. Certifications:
   1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements. Include certification that elevator hoistway dimensions and penthouse dimensions are acceptable to manufacturer.
   2. Submit certificate of compliance from authority having jurisdiction indicating approval of elevator system.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

1.7 PROJECT CONDITIONS

A. Verify dimensions of supporting structure at site by accurate field measurements so that elevator Work will be accurately fabricated and fitted to structure and that clearances and alignments are proper for installation of Work.

1.8 MAINTENANCE

A. Temporary Interim Service:
   1. When elevators have been installed to stage near completion and declared ready for service prior to completion and final acceptance of complete elevator system (start of maintenance and warranty periods), Owner may accept elevators for building use on interim basis.
   2. During period prior to final acceptance, Owner will pay mutually agreed amount for each day for each unit for maintenance of elevators accepted for interim use.
   3. During interim service period, user shall provide protection of cabs, entrances, and fixture to prevent damage.

B. Initial Maintenance Service:
   1. Maintain service of equipment for period of 12 months after date of final acceptance.
   2. Examine monthly; clean, adjust, and lubricate equipment.

3. Repair or replace parts whenever required. Use parts produced by manufacturer of original equipment.
4. Perform work without removing cars from service during peak traffic periods.
5. Provide emergency call back service 24 hours a day, 7 days a week.
6. Locally maintain adequate stock of parts for replacement or emergency purposes, and have qualified installation personnel available to ensure fulfillment of this maintenance service without unreasonable loss of time.
7. Maintenance service shall not be assigned or transferred to another agent or subcontractor without prior written consent of Owner.

C. Continuing Maintenance Agreement:
1. Furnish proposal to Owner for continuing maintenance agreement.
2. Submit proposed maintenance agreement along with separate price to furnish complete maintenance for first year of continuing maintenance program of 5 years.
3. Upon execution of agreement with Owner, commence maintenance service on date when initial maintenance services are concluded.

D. Maintenance Tools: Provide manufacturer's proprietary diagnostic and maintenance software tools and/or equipment to Owner at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Otis Elevator Company, Hartford, CT.
2. Thyssen Krupp Elevator Systems, Inc. (Formerly Dover), Memphis, TN.
3. Fujitec America, Inc., Totowa, NJ.
4. Kone (Formerly Montgomery), Moline, IL.
5. Schindler Elevator Corporation, Morristown, NJ.
6. U. S. Elevator Corporation, El Cajon, CA.

B. Contract Documents were prepared around pit and shaft sizes of Otis Elevator Company, Hartford, CT. If selection of different manufacturer requires dimensional change of surrounding construction, indicate changes on shop drawings and perform approved changes at no additional cost to Owner.

2.2 MATERIALS

A. Non-Shrink Grout: Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 4000 psi at 28 days.

B. Factory Primers and Paints:
1. Primer for steel surfaces: Rust inhibitive, alkyd type.
2. Primer for galvanized surfaces: Zinc chromate, alkyd type.
3. Finish paint for metal surfaces: Alkyd type, semi-gloss, enamel.
4. Colors: Manufacturer's standard.

2.3 COMPONENTS

A. Elevator Machinery and Operation: Refer to Section 142101 and 142400.

B. Finishes: Refer to Section 142750.

C. Cars:
1. Frame and platform:
a. Construct car of steel frame with steel or wood subfloor.
b. Mount platform on resilient pads.

D. Electrical Components:
1. Steel compression type fittings for electrical metallic tubing; fittings with set screws are acceptable only when separate grounding conductor is installed across joint.
2. Do not parallel conductors to increase current carrying capacity unless individually fused.
3. Do not use armored flexible metal conduit as grounding conductor.
4. Provide additional disconnect switches and wiring to suit machine room layout.

5. Include wiring and connections to elevator devices remote from hoistway and between elevator machine rooms.

E. Guide Rails:
1. Provide guide rails and supports complying with ASME A17.1.
2. Provide rails sized for travel, car weight, and support locations.
3. Include intermediate lateral support tie brackets and supports as necessary for span.

2.4 FABRICATION

A. Fabricate and assemble various parts in shop to minimize field assembly.

B. Trial assemble parts which cannot be shop assembled and which require close field fit; mark for field erection.

C. Provide concealed fasteners on surfaces exposed to public view.

D. Provide factory finish on components concealed from public view as follows:
1. Steel surfaces: Clean surfaces free of rust, oil, grease and other foreign matter; wipe clean with solvents; apply primer.
2. Galvanized surfaces: Clean with neutralizing solvent; apply primer.
3. Machine room components: Clean and degrease; apply one coat of primer followed by two coats of enamel paint.

2.5 ELEVATOR OPERATIONS

A. Fireman's Emergency Return Feature:
1. As required by local authorities and referenced Elevator Code.
2. Connect elevators to building fire alarm and smoke and/or heat sensing device systems. When actuated, registered calls are canceled and cars automatically return to designated level.
3. Provide keyed switch in each car in main car control panel to provide for fireman's access.
4. Fire floor: First Floor.
5. Alternate fire floor: Second Floor.
6. Fire control room station:
   a. Provide station in Fire Control Room containing read-out indicators to show location of each car within hoistway.
   b. Provide indicator lights to show motor generator sets in operation.
   c. Provide three-position key switch to recall elevators to main level if automatic recall has not been effected.
   d. Provide intercommunication system to permit communication between Fire Control Room and each car and between cars and Control Room.
7. Emergency return switch and box:
   a. Provide three-position key switch at fire floor and alternate fire floor for each group of elevators.
   b. Locate in left hoistway jamb, not less than 6'-6" above floor or at location required by Fire Department.
   c. Keep key required to call or operate elevators in custom, recessed metal box with lockable hinged cover mounted adjacent to key switch or mounted as required by Fire Department.
   d. Match finish of key switch and key box with hoistway jamb and engrave to read "EMERGENCY ONLY."
8. Fire emergency controls must be approved by Fire Marshall prior to fabrication.

B. Emergency Power Operation:
1. Provide emergency power of same characteristics as normal power supply for one car in each emergency powered group after loss of normal power.
2. Cars to operate on emergency power will be determined by Fire Marshall.
3. Elevator groups:
   a. Group 1: Elevators No. 7, 8, 9, and 10.
   b. Group 2: Elevators No.11 and 12
4. Designated cars automatically start and travel to group's fire floor, by-passing hall and car calls, stop, open doors, and shut down.

5. After first car of group shuts down, other cars of that group individually operate as described above.
6. After all cars have moved to their group's main level, one car shall operate at rated speed to serve car and hall calls under emergency power.
7. Provide emergency power operation to satisfy requirements of fire emergency control under emergency power conditions.

C. Security Service:
1. Provide operating control panel with keyed access switches for each floor as described in Section 142750 - Elevator Cabs, Hoistway Entrances, and Signals.
2. Provide key switches in cab control panel adjacent to each floor.
3. Provide key switches at hall call buttons for each floor.
4. Provide elevator operation interconnected with card reader access.

D. Independent Service Operation - Elevator No. [____]:
1. Provide keyed switch in car station for independent service operation.
2. When switch is turned to "SERVICE" position, elevator is removed from regular service and responds to calls registered from car buttons only.
3. Provide keyed switch at First Floor hoistway entrance which, when activated will take car out of regular service and allow independent service use.

E. Engineering Indicator Panel:
1. Locate in elevator control center as part of, or adjacent to, supervisory control panel.
2. As minimum, provide following:
a. Waiting passenger indicators for each floor.
b. Position and direction indicators for each elevator.
c. Control function indicators to assist maintenance and adjusting personnel to verify correct operation and trouble- shoot system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify that hoistways, pits, and equipment rooms comply with applicable standards and Contract Documents.

C. Review and approve structural tolerances, location of structural supports, miscellaneous metal fabrications, pit ladders, hoistway construction, heating, ventilating and air conditioning of equipment rooms; ventilating of hoistways; and electrical power, lighting and outlets required for elevator Work.

D. Verify that sill support angles are properly installed.

3.2 INSTALLATION

A. Install components of each elevator system in accordance with approved shop drawings, Section 017300, and requirements of referenced Elevator Code.

B. Install hoistway and machine room components. Connect equipment to building utilities.

C. Provide conduit, boxes, wiring, and accessories within machine room, hoistway, and signal outlets.

D. Guide Rails:
1. Install using threaded bolts with metal shims and lockwashers under nuts.
2. Compensate for expansion and contraction movement of guide rails.
3. Accurately machine and align guide rails. Form smooth joints with machined splice plates.
4. Bolt or weld brackets directly to structural steel hoistway framing.
5. Bolt brackets to inserts placed in concrete form work.

E. Hoistway Entrances:
1. Install hoistway door sills, frames, and headers in hoistway walls.
2. Grout sills in place using non-shrink grout.
3. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.
4. Fill hoistway door frames solid with grout.

F. Plunger-Cylinder Installation:
1. Drill excavation to accommodate installation of plunger-cylinder unit and maintain shaft free of water.
2. Install casings with waterproof seals at pit floor and with waterproof, high-pressure seal at bottom of casings.
3. Place casing full depth of shaft. Align to within 1/4 inch from plumb. Terminate top of casing flush with hoistway pit slab.
4. Install hydraulic piping without routing underground, wherever possible; where not possible, cover underground piping with permanent protective wrapping before backfilling. Backfill around hydraulic lines between plunger and remote machine room casing with select type fill; placed in 12 inch lifts compacted to 95 percent dry density.
5. Install plunger - cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place.

G. Machine Room Equipment:
1. Install with clearances complying with referenced codes and specifications.
2. Install items to allow removal by portable hoists or other means for maintenance and repair.
3. Install items so that maintenance access is safe and readily available.
4. Machine:
   a. Mount machine on vibration and acoustic isolators, on bed plate and concrete pad.
   b. Place machine on structural supports and bearing plates.
   c. Securely fasten to building supports.
   d. Prevent lateral displacement.

H. Welding:
1. Provide welded connections for installation of elevator Work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance and replacement of worn parts.
2. Comply with AWS standards for workmanship and for qualifications of welding operators.
3. Chip and remove oxidation and residue from field welds; wire brush weld; apply two coats of primer.

I. Hall Signals: Locate and properly install hall signals.

3.3 FIELD QUALITY CONTROL

A. Site Tests and Inspections: Comply with requirements of Section 014500.

B. Tests:
1. Conduct load test with full maximum load for each elevator car.
2. Test wiring system for insulation to ground.
3. Test performance of following:
   a. Starting, accelerating and running.
   b. Decelerating, leveling and stopping.
   c. Door operation and closing pressure.
4. Test security system and devices for proper operation.
5. Perform tests required by local authorities.

C. Test Results: In test conditions, ensure speed and performance times specified are met, leveling accuracy maintained without releveling and general riding quality is acceptable to Owner's representative.

D. Performance Adjustments:
1. Should tests uncover defects or poor workmanship, variance or noncompliance with requirements of specified codes and ordinances or variance or noncompliance with specified requirements, complete following Work and repairs at no additional expense to Owner.
2. Replace equipment that does not meet specified requirements or requirements of Elevator Code.
3. Perform Work and furnish materials and equipment necessary to complete specified operation and performance.
4. Perform retesting required by governing authority and Owner to verify specified operation or performance.

3.4 ADJUSTING

A. Balance cars to equalize pressure of roller guide shoes on rails.

B. Lubricate operating parts of systems, including ropes, as recommended by manufacturer.

C. Adjust motors, pumps, valves, generators, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, safety devices and other components to achieve required performance levels.

D. Alignment:
   1. Coordinate installation of hoistway entrances with installation of elevator guide rails, for accurate alignment of entrances with cars.
   2. Where possible, delay final adjustment of sills and doors until car is operable in shaft.
   3. Reduce clearances to minimum, safe, workable dimension at each landing.

E. Adjust cab movement on aligned guide rails to provide smooth movement, with no perceptible lateral or oscillating movement or vibration.

3.5 CLEANING

A. Keep work areas orderly and free from debris.

B. Remove loose materials and filings resulting from Work within hoistways.

C. Clean machine room equipment and floor of dirt, oil and grease.

D. Remove temporary protection and clean hoistway, car, cab enclosures, entrances, operating and signal fixtures, handrails and trim to remove dirt, oil, grease and finger marks.

3.6 DEMONSTRATION

A. Perform in accordance with requirements of Section 017500.

B. Provide instruction in elevator operation to Owner's designated personnel.

3.7 PROTECTION

A. Protect finished work in accordance with Section 017300.

B. Provide suitable protective coverings, barriers, devices, signs and other procedures to protect elevator Work from damage or deterioration.

C. Maintain protective measures throughout remainder of construction period.

END OF SECTION

SECTION 142101

IN-SHAFT MACHINE ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes in-shaft machine electric traction passenger elevators.

B. Related Sections:
   1. Section 142050 - General Elevator Requirements.
   2. Section 142750 - Elevator Cabs, Entrances and Signals.

PART 2 - PRODUCTS

2.1 ELEVATOR CRITERIA

A. Controller Location: In shaft.

B. Equipment Description: Gen2® gearless machine-room less elevator where all components fit inside the hoistway.
   1. Car: Car Number 5
      a. Equipment Control: Elevonic® Control System.
      b. Drive: Regenerative
      c. Quantity of Elevators: One
      d. Elevator Stops: Refer to Drawings
      e. Openings: Refer to Drawings
      f. Travel: Refer to Drawings.
      g. Rated Capacity: 3500 lb.
      h. Rated Speed: 350 fpm.
      i. Pit and cab sizes: as required by manufacturer.
   2. Car: Car Numbers 6 – 9:
      a. Equipment Control: Elevonic® Control System.
      b. Drive: Regenerative
      c. Quantity of Elevators: Two pairs of 2
      d. Elevator Stops: Refer to Drawings
      e. Openings: Refer to Drawings
      f. Travel: Refer to Drawings.
      g. Rated Capacity: 3500 lb.
      h. Rated Speed: 350 fpm.
      i. Pit and cab sizes: as required by manufacturer.
   3. Cab Height: 7'-9".
   4. Hoistway Entrances: 3'-6" Wide X 7'-0" High
   5. Main Power Supply: 480 Volts + or - 5% of normal, three-Phase, with a separate equipment grounding conductor. Transformer (at additional cost) required for voltages other than 480 volts.
   6. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.
   7. Machine Location: Inside the hoistway at the top of the hoistway.
   8. Signal Fixtures: Manufacturer's standard with metal button targets.
   9. Controller Location: Refer to Drawings
   10. Performance:
      a. Car Speed: $\pm$ 3 % of contract speed under any loading condition or direction of travel.
      b. Car Capacity: Safely lower, stop and hold up to 120% of rated load. (code required).
      c. Ride Quality:
         1) Vertical Vibration (maximum): 20 milli-g
         2) Horizontal Vibration (maximum): 12 milli-g
         3) Vertical Jerk (maximum): 4.59 $\pm$ 1.0 ft./ sec^3 (1.4 $\pm$ 0.3 m/ sec^3)
         4) Acceleration/Deceleration (maximum): 2.62 ft./ sec^2 (0.8 m/ sec^2)
         5) In Car Noise: 55 – 60 dB(A)
         6) Stopping Accuracy: $\pm$ 0.375 in. ($\pm$ 10 mm) max, $\pm$ 0.25 in. ($\pm$ 6 mm) Typical

11. Additional Features:
    a. Audible signals at landings and in cab.
    b. Voice synthesizer to announce cab direction and landing served.
    c. Anti-nuisance device to sound buzzer when door is propped open.
    d. Load weighing switch.
    e. Reverse phase relay.
    f. Service cabinet.
    g. Intercom system.
    h. Independent service.

2.2 MATERIALS

A. Steel:
   1. Sheet Steel for Exposed Work: Stretcher-leveled, cold-rolled, commercial-quality carbon steel, complying with ASTM A366, matte finish.
   2. Sheet Steel for Unexposed Work: Hot-rolled, commercial-quality carbon steel, pickled and oiled, complying with ASTM A569.
   3. Structural Steel Shapes and Plates: ASTM A36 and AISI 1018.

B. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.

C. Fire-Retardant Treated Particleboard Panels: Minimum 0-1/2" (13 mm) thick backup for plastic laminate veneered panels, provided with suitable anti-warp backing; to meet ASTM E84 Class "A" rating with flame-spread rating of 25 or less.

D. Paint:
   1. Concealed Steel and Iron: Clean metal of oil, grease, scale and other foreign matter and paint one shop coat of manufacturer's standard rust-resistant primer. Galvanized metal need not be painted.
   2. Exposed Steel: Clean exposed metal of oil, grease, scale and other foreign matter. Eliminate any dents, scratches, or other defects that would affect the final finish. For material delivered with primer coat only, apply enamel primer. For material delivered with a finish coat, apply two coats enamel.

2.3 EQUIPMENT: HOISTWAY COMPONENTS

A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway

B. Governor: Friction type over-speed governor rated for the duty of the elevator specified.

C. Buffers: Car and Counterweight

D. Hoistway Operating Devices:
   1. Emergency stop switch in the pit.
   2. Terminal stopping switches.
   3. Emergency stop switch on the machine.

E. Positioning System: System consisting of magnets and proximity switches.

F. Controller: Provide microcomputer based control system to perform all of the functions. The system shall also perform car and group operational control.
   1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
   2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
   3. Provide a serial cardrack and main CPU board containing a non-erasable EPROM and operating system firmware.
   4. Variable field parameters and adjustments shall be contained in a non-volatile memory module

G. Guide Rails and Attachments: Steel rails with brackets and fasteners. Side counterweight arrangements to have a dual-purposed bracket that combines one car rail with one counterweight rail on the machine side. Additional bracket supports the other counterweight rail on the machine side and a separate bracket supports the other car rail opposite the machine.

H. Governor Rope: Provide 3/8-inch diameter steel cable governor rope minimum eight strands wound about a sisal core center.

I. Fascia: Galvanized sheet steel shall be provided at the front of the hoistway.

J. Hoistway Entrances
1. Sills: extruded aluminum.
2. Doors: Hollow metal construction with vertical internal channel reinforcements.
3. Fire Rating: Entrance and doors shall be UL fire-rated for 1-1/2 hour.
4. Entrance Finish: Stainless steel.
5. Entrance Markings Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plates shall be surface mount mounted. Plate finish to match surface mount.

K. Hoist Beam: Coordinate with Section 055000.

2.4 EQUIPMENT: ELEVATOR OPERATION AND CONTROLLER

A. Duplex Selective Collective:
1. With 2 cars in service and no calls registered, one car parks at Ground Level and becomes "home" car.
2. Other car parks where last used and becomes "free" car.
3. Registration of hall call away from home floor or car call in free car causes free car to respond.
4. After car has started, respond to calls registered for direction of travel in order in which floors are reached.
5. Once direction of travel has been established, car will not reverse direction until car calls have been answered or hall calls ahead of car and corresponding to direction of car travel, have been answered.
6. Car slows down and stops automatically at floors corresponding to registered calls, in order in which they are approached in each direction of travel.
7. As slow down is initiated for hall call, call is automatically canceled and hall button for direction of travel remains ineffective until elevator leaves floor.
8. Car calls are similarly canceled.
9. Car remains at arrival floor with predetermined time interval sufficient to allow passenger transfer; timing feature must be adjustable.
10. Car answers calls corresponding to direction in which car is traveling, except car may answer call in opposite direction if call is highest or lowest call registered.
11. When free car is clearing calls home car responds to:
    a. Call registered on home car buttons.
    b. Up hall call registered below free car which free car is traveling up.
    c. Up or down call registered above free car while free car is traveling down.
    d. Hall call registered and free car is delayed in its normal operation for predetermined period.
12. When both cars are clearing calls, only one car stops in response to registered hall call.
13. First car to clear calls returns and becomes home car.
14. Should last service required bring both cars to main floor, car arriving first becomes free car.
15. Registration of call causes appropriate button to illuminate.
16. When call is answered, light is extinguished.

B. Standard Operating Features to include:
1. Full Collective Operation
2. Fan and Light Control.
3. Car-stall protection.
4. Firefighters' Service.
5. Load Weighing Bypass.
6. Ascending Car Uncontrolled Movement Protection

7. Top of Car Inspection Station.
8. Access key-switch at top floor in entrance jamb and lowest floor in entrance jamb.
9. Front/Back Left Door Operation.

C. Elevator Control System for Inspections and Emergency:
1. Provide devices within controller to run the elevator in inspection operation.
2. Provide devices on car top to run the elevator in inspection operation
3. Provide within controller an emergency stop switch to disconnect power from the brake and prevents motor from running.
4. Provide the means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.
5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
7. Provide the means for the control to reset elevator earthquake operation.

2.5 EQUIPMENT: DOOR OPERATOR AND CONTROL

A. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.

B. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.

C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.

D. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.

E. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work when substrates are ready.

END OF SECTION

SECTION 142400

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 142050 - General Elevator Requirements.
   2. Section 142750 - Elevator Cabs, Entrances, and Signals.

PART 2 - PRODUCTS

2.1 ELEVATOR CRITERIA

A. Elevators No. 4:
   1. Capacity and speed: 4500 pounds, 125 fpm.
   2. Floors served: 2
   3. Stops and openings: 2 stops, 2 openings; front.
   4. Power supply: 460/480 volt, 3 phase, 60 hertz.
   5. Machine type and location: Hydraulic with machine room located at Basement.
   6. Operation: Single automatic.
   7. Platform size: Refer to Drawings.
   8. Cab size (inside dimensions): Refer to Drawings.
   9. Cab height: 8'-0" to canopy with 7'-4" clear at ceiling.
   10. Door opening: 3'-6" by 7'-0", single speed side opening.
   11. Home landing: Same as Fire Floor.
   12. Additional Features:
      a. Audible signals at landings and in cab.
      b. Voice synthesizer to announce cab direction and landing served.
      c. Anti-nuisance device to sound buzzer when door is propped open.
      d. Load weighing switch.
      e. Reverse phase relay.
      f. Service cabinet.
      g. Intercom system.
      h. Independent service.

B. Elevators No. 3:
   1. Capacity and speed: 4500 pounds, 125 fpm.
   2. Floors served: 2
   3. Stops and openings: 2 stops, 2 openings; front.
   4. Power supply: 460/480 volt, 3 phase, 60 hertz.
   5. Machine type and location: Hydraulic with machine room located at Basement.
   6. Operation: Single automatic.
   7. Platform size: Refer to Drawings.
   8. Cab size (inside dimensions): Refer to Drawings.
   9. Cab height: 8'-0" to canopy with 7'-4" clear at ceiling.
   10. Door opening: 3'-6" by 7'-0", single speed center opening.
   11. Home landing: Same as Fire Floor.
   12. Additional Features:
      a. Audible signals at landings and in cab.
      b. Voice synthesizer to announce cab direction and landing served.
      c. Anti-nuisance device to sound buzzer when door is propped open.
      d. Load weighing switch.
      e. Reverse phase relay.
      f. Service cabinet.
      g. Intercom system.
      h. Independent service.

2.2 EQUIPMENT

A. Motors, Pumps, Valves, Regulators, Fluid Tank, Hydraulic Fluid, Controller, Controls, Buttons, Wiring and Devices, Indicators: UL approved.

B. Spring Buffers, Attachment Brackets and Anchors: Designed and sized according to code with safety factors.

C. Pump Housing: Sheet steel, acoustically insulated, removable.

D. Cylinder and Plunger:
   1. Provide manufacturer's standard single-acting, direct-lift assembly constructed in accordance with code requirements and designed for pressures resulting from contract load and speed requirements.
   2. Fabricate cylinder of steel pipe.
   3. Treat cylinder interior with rust preventative coating and outside with heavy duty bitumastic or tape wrap sealed with resin.
   4. Fabricate plunger of seamless steel tubing or piping, machined true and smooth with fine polished finish.
   5. Provide manufacturer's standard oil seal assemblies, including scavenger unit with filters mounted on jack to return seepage oil to oil reservoir. Include water trap and bleeder valve.

E. Provide steel casing for well.

F. Hydraulic Power Unit:
   1. Provide manufacturer's standard, self-contained unit, of compact design, equipped with auxiliary devices and fittings as required for operation.
   2. Provide valves of adjustable design to ensure smooth starts and stops including up start and up leveling valves, down lowering and down leveling valves, check valve, relief valve, tank shut off valve, and manual lowering valve.
   3. Provide muffler in discharge oil line near pump unit to dampen and absorb pulsation and noise in flow of hydraulic fluid.
   4. Motor:
      a. A.C. polyphase squirrel cage induction, type, size and design as required and especially adapted for electro-hydraulic requirements.
      b. Starting current of motor: Less than 3 times running current.
      c. Equip with solid state starters.
   5. Pumping unit:
      a. Self contained unit which includes motor, positive displacement screw type pump, hydraulic control system, storage tank, necessary piping and controller.
      b. Mount motor and pump on rubber isolated inner base.
      c. Storage tank of steel construction and steel frame. Provide cover, vent opening, oil fill, oil level gage and filters. Incorporate reserve capacity of not less than 10 gallons.

G. Controller Unit:
   1. Provide microprocessor controller including necessary starting switches of adequate size with relays, switches and hardware required to provide specified operation.
   2. Provide overload relays and thermal unit or comparable system to maintain oil at operating temperature.
   3. Provide low oil feature which will automatically cause elevator car to descend to lowest terminal landing if system runs low of oil during ascending of car; open doors and prevent operation of elevator until oil supply has been replenished.

H. Two-Stop Collective:
   1. Registration of hall call at floor where car is idle, automatically opens doors.
   2. Registration of hall call at other floor call car and automatically opens doors upon arrival.
   3. Car slows down and stops automatically at opposite floor.
   4. As slow down is initiated for hall call, call is automatically canceled.
   5. If call is registered while car is in transit, call remains registered until car responds to call.
   6. Car remains at arrival floor with predetermined time interval sufficient to allow passenger transfer; timing feature must be adjustable.
   7. Registration of call causes appropriate button to illuminate.
   8. When call is answered, light is extinguished.

I. Piping:
   1. Provide size, type and weight as recommended by manufacturer and required by Code.
   2. Connect piping to pumping unit with sound isolation coupling to prevent transmission of sound or vibration.
   3. Provide shut off valve in pit for maintenance and adjustment purposes.

J. Guide Rails, Buffers, Attachment Brackets, and Anchors: Designed and sized according to code with applicable safety factors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Section 142050 - General Elevator Requirements for provisions regarding installation.

END OF SECTION

SECTION 142750

ELEVATOR CABS, ENTRANCES, AND SIGNALS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections:
1. Section 142050 - General Elevator Requirements.
2. Section 142101 – In-Shaft Machine Electric Traction Elevators.
3. Section 142400 - Hydraulic Elevators.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sheet Steel: Cold rolled, commercial quality, Class I, stretcher- leveled, matte finish, ASTM A1008.

B. Stainless Steel:
1. Sheet: UNS S30200/S30400, ASTM A240.
2. Tubes: ASTM A269.
3. Reveals and trim: Minimum 16 gage, ASTM A276.

C. Extruded Aluminum: Alloy 6063-T6, ASTM B221.

D. High Pressure Laminate:
1. Type: Comply with NEMA LD3; 0.050 inch thick.
2. Colors, texture, and finish: Selected by Architect from one of listed laminate manufacturer's full color line.
3. Acceptable products and manufacturers:
   a. Formica, Formica Corporation, Cincinnati, OH.
   b. Nevamar, International Paper Decorative Products, Odenton, MD.
   c. Pionite, Pioneer Plastics Corporation, Auburn, ME.
   d. Wilsonart, Wilsonart International, Inc., Temple, TX.

E. Wood:
1. Panels:
   a. Minimum 3/4 inch thick with particleboard or plywood cores, fire-retardant treated.
   b. Provide anti-warp backing, registered with local authority having jurisdiction for elevator finish materials.

F. Flooring:
1. Elevator Number 4: Resilient Flooring: Manufacturer's standard resilient tile with colors selected by Architect from full range of available colors.
2. Elevator Number 5: Resilient Flooring: Manufacturer's standard resilient tile with colors selected by Architect from full range of available colors.
3. Elevator Numbers 6 - 9: Refer to Drawings.

G. Protection Pads and Buttons - Elevators No.3:
1. Type: Flame resistant fabric and filling with sufficient stitching to prevent sagging of filling.
2. Attachment devices: Manufacturer's standard stainless steel buttons and grommets.
3. Cutouts: Provide cutouts for control stations and other signal devices.

2.2 COMPONENTS AND FABRICATION

A. Cabs:
1. Shell:
   a. Fabricate from manufacturer's standard steel construction, suitably reinforced for rigidity and cutout for accessories and panels.
   b. Make joints between panels vertical and flush.
   c. Provide sound deadening at backs of panels.
   d. Reinforce canopy/ceiling construction as necessary to maintain loads applied during car top inspection.
   e. Provide car top emergency and inspection hatches required by code.

2. Doors:
   a. Flush construction, minimum 16 gage metal, suitably reinforced, sound deadened, minimum 1 inch thickness.
   b. Reinforce as required.
   c. Equip with guides of design that will permit replacement without removal of doors.
3. Ventilation:
   a. Provide exhaust fan with 2-speed operation.
   b. Provide suitable sound insulation to provide quiet operation of exhaust unit.
   c. Provide vent slots within base or near bottom of panels.
4. Emergency lighting: Provide emergency lighting in each cab; manufacturer's standard, unless otherwise indicated.
5. Sill: Extruded aluminum.

B. Hoistway Entrances:
1. Fire Rating:
   a. Fabricate assemblies as tested and approved by Underwriters' Laboratories or other national recognized testing agency approved by authorities having jurisdiction.
   b. Comply with requirements of NFPA 80.
   c. Meet requirements of NFPA 252, or UL 10B.
   d. Identify each assembly with factory applied label indicating applicable fire rating.
2. Doors:
   a. Fabricate doors of flush hollow metal construction, minimum 1-1/4 inch thick; 2-3/4 inch thick in conjunction with flush transom panels, minimum(16 gage metal with internal vertical reinforcing extending full height of door.
   b. Provide sight guards formed of minimum 16 gage metal, finish to match exposed door finish.
3. Frames:
   a. Fabricate of minimum 14 gage metal with flush welded corners ground smooth and sound-deadening material applied to back surface.
   b. Sizes and profiles indicated.
4. Sills: Extruded aluminum.

C. Hoistway and Cab Door Operators:
1. Provide electric operators designed to smoothly open and close cab and hoistway doors simultaneously at maximum rate of 1.6 seconds from start of opening to fully open.
2. Door edge devices:
   a. Mechanical-electrical protection device: Equip cab doors with retractable door edge to prevent operation of cab unless door is closed and reopen door automatically at any point on contact with object.
   b. Electronic detection device: In addition to mechanical-electrical device, equip cab doors with photo-electric or cold cathode safety edge device which will stop and reopen door when light paths are broken or electric-magnetic field is disturbed by close proximity of person or object.
   c. Nudging feature: Include audible warning signal and nudging feature which will slowly close doors held open for extended period of time.

D. Emergency Lighting:
1. Battery-powered fixture conforming to requirements of referenced Elevator Code.
2. Conceal emergency lighting location.

E. Raised and Braille Markings: Comply with requirements of ADA.

2.3 MECHANICAL FINISHES

A. Stainless Steel: No. 4 satin finish with vertical directional texture.

2.4 FINISH SCHEDULE

A. Hoistway Entrances:
1. Elevator Number 3-4: Low sheen baked enamel in custom manufacturer's standard colors.
2. Elevator Number 5: Stainless steel.
3. Elevator Numbers 6 - 9: Stainless Steel.

B. Cabs:
1. Elevator Numbers 3 and 4:
a. Doors: Stainless steel.
b. Entrance columns: Stainless steel.
c. Return panels: Stainless steel.
d. Transom: Stainless steel, between entrance column design.
e. Base: Stainless steel, recessed design with concealed vents.
f. Side walls: Manufactures standard stainless steel for service elevators.
g. Rear wall: Manufactures standard stainless steel for service elevators.
h. Lighting: Fluorescent, located above suspended ceiling and spaced for uniform illumination, complete with 40W warm white bulbs.
2. Elevator Number 5:
a. Doors: Stainless steel.
b. Entrance columns: Stainless steel.
c. Return panels: Stainless steel.
d. Transom: Stainless steel, between entrance column design.
e. Base: Stainless steel, recessed design with concealed vents.
f. Side walls: High pressure laminate panels with 1 inch black reveal at perimeter edges and between panels.
g. Rear wall: High pressure laminate panels with one inch black reveal at perimeter edges and between panels.
h. Lighting: Refer to Drawings
3. Elevator Numbers 6 - 9:
a. Doors: Stainless steel.
b. Entrance columns: Stainless steel.
c. Return panels: Stainless steel.
d. Transom: Stainless steel, between entrance column design.
e. Base: Stainless steel, recessed design with concealed vents.
f. Side walls: High pressure laminate panels with 1 inch black reveal at perimeter edges and between panels.
g. Rear wall: High pressure laminate panels with one inch black reveal at perimeter edges and between panels.
h. Lighting: Refer to Drawings

C. Colors:
1. Where specified as custom, match sample furnished by Architect.
2. Where specified as manufacturer's standard, as selected by Architect from full range of available colors.

2.5 CONTROLS AND SIGNALS

A. Cab Controls:
1. Car operating panel:
a. Provide one operating panel per cab.
b. Provide manufacturer's standard panel.
c. Provide panel of back mounted design within swing return panel without separate faceplate.
d. Provide buttons of round illuminated design corresponding to each landing served.
e. Provide door open, door close and emergency alarm buttons.
f. Provide fire department emergency key switch , independent service operation key switch with key removable only in off position , security key switch , telephone jack for emergency fire communication.
g. Provide tactile handicapped markings engraved adjacent to each button; material and finish same as panel.
h. Provide manufacturer's standard tactile handicapped markings adjacent to each button.
2. Service cabinet:
a. Key operated door of design and material matching operating panel and equipped with concealed hinge.
b. Provide dimmer switch for car lighting.

c. Provide switch for exhaust fan.
d. Provide emergency stop button, except where required by code to be mounted in car operating panel.
e. Provide duplex electrical service receptacle.
f. Provide switch for disconnecting electronic door edge detection device.
g. Provide other key switches or devices required to service elevator.

3. Telephone cabinet:
   a. Door of design and material matching operating panel and equipped with concealed hinge.
   b. Provide fully connected phone handset; complete with associated traveling cables.
4. Car position indicators:
   a. Digital type.
   b. Mount in transom [Mount over each car operating panel].
   c. Provide floor designations and directional arrows.
   d. Provide audible gong to indicate that car is stopping at or passing each floor served.
   e. Provide No. 4 satin stainless steel faceplate.

B. Hall Buttons:
1. At each terminal landing, provide single push button.
2. At each intermediate landing, provide fixture containing "UP" and "DOWN" push buttons.
3. When pressed, buttons illuminate and remain illuminated until call is answered.
4. Provide one riser for each bank of elevators.
5. Faceplate:
   a. Passenger elevator - Lobby level: Custom design indicated.
   b. Passenger elevator - Floors 2 - 7: Custom design indicated.
   c. Service elevator: Manufacturer's standard design, No. 4 satin stainless steel.

C. Hall Lanterns:
1. Parking Garage Level, all Elevators: Direction lantern illuminating white for up and red for down, over each hoistway entrance, refer to Drawings.
2. Lantern illuminates indicating direction of travel.
3. Audible signal:
   a. Provide lantern with gong sound approximately four seconds before car door opening; once for up direction, twice for down direction.
   b. Equip gong with adjustable volume.
   c. Permit gong to sound in response to hall calls but not in response to car calls.
4. Faceplate: Custom design indicated.

D. Hall Position Indicators:
1. Integral digital or LED read-out type design at Ground Floor only.
2. Provide floor designations and direction arrows.
3. Faceplate: Custom design indicated.

E. Lobby Control and Indicator Panel:
1. Provide panel containing communication and control items including direct drive switches and emergency power operation switches, in flush-mounted panel with lockable, hinged door.
2. Provide car position and travel direction indicators for each car, emergency power operation indicator, motor-generator light, intercom, security systems, and car operating light in exposed faceplate of same material and as component part of panel.
3. Provide control function indicators to assist maintenance and adjusting personnel to verify correct operation and trouble-shoot system
4. Faceplate: No. 8 mirror polish stainless steel.

F. Emergency Signage:
1. Provide plate of same metal and finish as hall button faceplate with lettering etched in metal and filled with black paint.
2. Size and style of letters as selected by Architect.
3. Sign shall read "In case of fire elevators are out of service; use exit stairs" or other similar text acceptable to authority having jurisdiction.
4. Mount above each hall button.

G. Capacity and No Smoking Signs:
   1. Provide plate of same metal and finish front return panel with lettering etched in metal and filled with black paint.
   2. Concealed mounted design; exposed fasteners not permitted.
   3. Size and style of letters as selected by Architect.

H. Raised and Braille Markings: Comply with requirements of ADA.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Section 142050 - General Elevator Requirements for provisions regarding installation.

END OF SECTION

SECTION 144200

WHEELCHAIR LIFTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Vertical platform wheelchair lifts.

B. Related Sections:
   1. Section 033000 - Cast-in-Place Concrete: Setting of sleeves, inserts, and anchoring devices in concrete.
   2. Section 055000 - Metal Fabrications: Subsills and structural framing of runway gates.
   3. Section 099000 - Painting and Coating: Field painting.
   4. Division 26 - Electrical service to each lift, including fused disconnect switch.

1.2 DEFINITIONS

A. Lift assembly is defined to include driving machines, platforms, runway gates, access panels, guide rails, drive system, buffers (if any), signals, control systems, electrical wiring, and devices necessary to provide specified or Elevator Code-required performance operations, safety, or security of complete lift assembly. Include self-supporting lift structure as indicated.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit manufacturer's complete technical product data and installation instructions for each item specified, indicating capacities, dimensions, performances, operations, safety features, controls, finishes, and similar information.

C. Shop Drawings: Submit plans, elevations, and details showing interfaces with other work including loading on structure, together with indication of required clearances.

D. Samples: Submit samples of exposed finishes for platform, gates, runway, track, and control devices; 3 by 6 inch or larger samples of sheet materials, and 10 to 12 inch lengths of running trim members.

E. Closeout Submittals:
   1. Operation and Maintenance Data: Submit bound manuals for each different type lift, with operating and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information.
   2. Warranty: Submit specified product warranty in accordance with Section 017800.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

B. Regulatory Requirements: In addition to local governing regulations, comply with ASME A18.1 and ICC/A117.1.

1.5 WARRANTY

A. Provide warranties in accordance with Section 017800.

B. Provide written warranty jointly signed by manufacturer, installer and Contractor agreeing to repair and/or replace assemblies which fail in material or workmanship during warranty period of 2 [5] years from date of Substantial Completion.

1.6 INSTRUCTION AND MAINTENANCE

A. Refer to Section 017500. Instruct Owner's personnel in proper operation and maintenance of lift. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions.

B. Maintenance: Starting at date of Substantial Completion, provide full maintenance of units for a period of 12 months on a quarterly site visit/preventive maintenance basis. Correct operational imperfections and restore or replace defective or deteriorated components and finishes. Use only genuine parts, components, and supplies as used in the manufacture and installation of original equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Basis of Design: Model BC by National Wheel-O-Vator, Inc. Division of ThyssenKrupp Access.
2. Garaventa Lift
3. Giant Lift Equipment Mfg. Co. Inc.
4. Inclinator Company of America.
5. Lift-Avator, Inc.

2.2 MATERIALS AND COMPONENTS

A. General: Provide manufacturer's standard pre-engineered lift systems that comply with specified requirements. Provide manufacturer's products [as indicated] in published product literature and as specified for complete lift systems.

B. Systems and Machinery: Provide lift system to comply with the following requirements:
1. Rated Capacity: 750 pounds.
2. Lifting Height: 48 inches VIF
3. Platform size: 37 x 51 inches, with non-skid surface.
4. Rated Speed: 12 ft. per minute.
5. Power Supply: 208 VAC, 3-phase, 60 Hz.
6. System Control Voltage: 24 VAC.
7. Self-Supporting Structure: provide units with structural steel self-supporting framing that requires vertical-load support only at base and lateral support only at landing levels.
8. Inserts: Furnish required concrete inserts and similar anchorage devices required for the installation of structural members, guide rails, machines, and other components. Installation of such inserts and devices is specified in other divisions of the specifications.
9. A grab rail shall be provided on the platform.
10. The main lift nut will be equipped with a continuous lube system to distribute lubrication between main lift nut and the Acme screw.
11. A gate with a min. height of 42 inches and a combination mechanical lock with a positive opening electric contact shall be provided at the upper landing.
12. A gate with a combination mechanical lock with a positive opening electric contact shall be provided at the lower level. The height shall depend on model and code requirements.

C. Runway Enclosure: Manufacturer's standard rectangular steel-tube frame with flush steel-sheet panels.
1. Gates: Rectangular steel-tube frames glazed with 1/4 inch thick, clear acrylic glazing and with 12-inch high, steel kick panels.

D. Runway Enclosure: Manufacturer's standard weather-protective structure of glazed extruded-aluminum framing with tinted, acrylic dome roof.
1. Glazing: Bronze-tinted acrylic glazing, 1/4 inch thick.
2. Doors: Wide-stile aluminum entrance doors.

E. Platform: 0.123-inch-thick, galvanized steel sheet with black rubber flooring.

F. Platform Sides: Rectangular steel-tube frames with flush steel-sheet panels.

G. Fixed Ramps: Provide fixed ramps matching platforms to provide transition from floor to lift platform at bottom landings.

H. Control System: Provide key-operated switch at each control station that will permit "up" and "down" buttons to become effective only when the key is in the "on" position. Controls to comply with requirements of ANSI/ASME A117.1.
   1. Constant pressure up/down control switch shall be installed at each landing level and on the platform.
   2. Provide solid-state control system to greatest extent of availability, supplemented with electromechanical equipment.
   3. Leveling Tolerance: Provide terminal stopping system at each extreme of travel and adjust to maintain level tolerance within 1/2 inch regardless of load size or direction of travel.
   4. Limit Switches: Provide at both top and bottom extremes of travel.
   5. Obstruction Sensors: Provide sensors to cut power and stop unit in the event of contact with foreign object within pathway of travel. Comply with Elevator Code.
   6. Safety Device: Provide safety device to stop platform in event of overspeed condition or of breakage or slackening of suspension of support means.
   7. Manual Lowering: Provide means to manually lower platform in case of malfunction or power loss.

I. Materials and Finishes: Comply with the following:
   1. Enameled Steel: Formed steel units with manufacturer's standard baked synthetic enamel finish, colors selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with work in accordance with Section 017300.

B. Verify electrical power, lighting and outlet are of correct characteristics.

C. Examine supporting members to ensure surfaces are at proper elevation and are free from dirt or other deleterious matter.

3.2 INSTALLATION

A. General: Comply with manufacturer's instructions and recommendations for work during installation.
   1. Enclose wiring within housings of units or building construction. Do not use conduit exposed to view in finished spaces.

B. Alignment: Coordinate runway gates with platform travel and positioning, for accurate alignment and minimum clearance between platform, runway gates, sills, and gate frame at each landing.

C. Position sills accurately with floors or pavement, raised slightly above adjoining surface to minimize intrusion of dirt and spillage into runway. Coordinate with other trades to ensure that sills, or lower member of frames, are solidly grouted (no voids) with a nonstaining, nonshrinking grout.

D. Adjust stops for accurate leveling at each landing, within specified tolerances.
   1. Leveling Tolerance: 1/4 inch up or down, regardless of load and direction of travel.

E. Lubricate operating parts of lift, including drive mechanism, guide rails, gates, safety devices, and hardware.

3.3 FIELD QUALITY CONTROL

A. Site Tests:
   1. Comply with requirements of Section 014500.
   2. Test operate lift continuously between lowest and highest landings served, lifting full rated capacity load for a minimum period of 30 minutes. Readjust stops and other devices and signal equipment for accurate landings and operation of system after completion of test.

3.4 DEMONSTRATION

A. Provide system demonstration under provisions of Section 017500.

B. Demonstrate operation of wheelchair lift to Owner's designated personnel.

END OF SECTION

SECTION 149133

LINEN CHUTE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Linen chutes intakes, discharge, floor frames, sprinklers, vent and attendant accessories.
   2. Optional equipment.

B. Related Sections:
   1. Section 078400 - Firestopping: Firestops
   2. Division 21 – Fire Suppression: Supply connections and services to fire sprinkler heads.
   3. Division 22 – Plumbing: Supply connections and services to sanitizer.
   4. Division 26 - Electrical: Service, interlock wiring, and conduit.

1.2 SYSTEM REQUIREMENTS

A. Design Requirements: Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   1. Provide soiled linen removal system complete with vertical chute, intake doors, discharge door, access doors, sprinkler heads, roof termination vent and flashing assembly.
   2. Provide for firestops at floor penetrations, expansion/contraction and installation complying with required codes and ordinances.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit for linen chutes.

C. Shop Drawings: Submit for linen chutes. Indicate:
   1. Typical floor plans.
   2. Chute fabrication and connections details, including intake, access and discharge door assemblies.
   3. Finishes and material thickness.
   4. Floor support.
   5. Venting, including roof counterflashing and curb.
   6. Isolation and clearances.
   7. Piping connections and locations for fire sprinklers.
   8. Distinguish between factory fabrication and field assembly.

D. Informational Submittals: Submit following packaged separately from other submittals:
   1. Manufacturer's instructions.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Provide linen chute components from same manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years experience.

C. Installer Qualifications: Acceptable to manufacturer with experience on at least five projects of similar nature in past five years.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. American Chute Systems, Joliet, IL.
2. Chutes International, White Plains, MD.
3. Midland Chutes, Schiller Park, IL.
4. Western Chutes, Covina, CA.
5. Wilkinson Hi-Rise, Hollywood, FL.
6. Accepted Substitute in accordance with Section 012500.

2.2 MATERIALS AND COMPONENTS

A. Linen Chute: 24 inch inside diameter.
1. Material: 16 gage stainless steel.
2. Automatic on-off sprinklers.
3. Smoke detectors.
4. Heat detectors.
5. Provide fasteners and other accessories necessary to complete chute assembly and installation.

B. Linen Chute Intake Doors: Side hinged.
1. Size: 21 inch wide by 21 inch high, compatible with chute diameter.
2. Operation: T-Handle, self-closing with fire-rated latching device.
3. Hinge: Heavy duty piano type.
4. Front: 20 gage, UNS S30400 stainless steel, ASTM A240.
   a. Stainless Steel No. 4 Finish.
5. Back and Wings: 18 gage aluminized steel.
6. Trim: 20 gage stainless steel, match door finish.
7. Label: 1-1/2 hour 250 degrees F, UL B label, ASTM E2074.
8. Emboss name plate with words soiled linen across top of door.
9. Electrically interlocked intake doors to allow use of only one chute door at a time.

C. Linen Chute Discharge Door: Size to be compatible with chute diameter.
1. Type: Side discharge, top-hinged, hopper with impact plate and bottom drain [Direct discharge, with swing door, spring-loaded, self-closing with 165 degree F fusible link.
2. Material: 12 gage stainless steel.

D. Linen Chute Roof Vent: Same size and material as chute.
1. Extend to 4 feet above roof level.
2. Provide full diameter screened vent area.
3. Metal explosion-release, safety, weather cap.
4. Roof Vent Flashing: Flashing Collar and clamping ring compatible with chute metal.

E. Linen Chute Support Assemblies
1. Support Clips: 1-1/2 by 3/16 inch bar stock, factory welded to chute.

F. Linen Chute Access Doors:
1. Size, Material, Finish and Label: Match intake doors.
2. Locations: As required for access to valves, controls and sprinkler heads within chute.

G. Building Service Chute Fire Sprinkler Heads: Manufacturer’s standard to suit project specific requirements and applications.
1. Location: Above top intake door, bottom service door, and above intake doors at alternate floors below.
2. See Division 21.

2.3 FABRICATION

A. Linen Chute: Fabricate linen chute to comply with NFPA 82.
1. Factory fabricate and assemble linen chute in sections for shipment to site.
2. Fully factory assemble, including intake, discharge and access doors.
3. Mate chute sections to fit inside sections below.

4. Weld or lock-seam tight joints except those required to separate sections for shipment and installation at site.
5. Do not allow bolts, clips or other projections inside chute to prevent snag of flowing material.

B. Linen Chute Intake, Discharge and Access Doors: Fully factory fabricate and assemble.
1. Bolt doors to throat formed by chute tube.
2. Slot mounting holes to allow on-site adjustment.

C. Linen Chute Support Assemblies: Pre-position floor frames and factory weld support clips to chute sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 INSTALLATION

A. Linen Chute: Install linen chute at location indicated.
1. Install in accordance with Section016000 and approved Shop Drawings.
2. Assemble and install components and sections plumb, level and square with tight, non-leaking joints.
3. Anchor securely to supporting structure with suitable and sufficient anchorages to withstand impacts from uses and wind loading stresses on vent unit.
4. Provide for thermal expansion movement of chute sections between support points.
5. Provide and secure fire stop in space between chute wall and each floor or roof deck penetration prior to installation of chute enclosure walls.
6. Do not puncture, dent or otherwise damage chute sections or intakes.
7. Install accessory devices necessary for complete installation.

B. Linen Chute Fire Sprinkler Heads: Install in compliance with Code. Coordinate sprinklers with Division 21. Comply with NFPA 13.

C. Linen Chute Roof Vent Flashing: Install in accordance with manufacturer's recommendations for roof conditions encountered.

D. Install electrical conduit, wiring and controls for operation of interlock system, heat control devices and smoke detector. Comply with applicable electrical codes.

3.3 FIELD QUALITY CONTROL

A. Site Tests: Comply with Section 014529.
1. Test operate components of chute system upon completion of installation.
2. Operate doors and interlock system to demonstrate that hardware is adjusted and electrical wiring is connected correctly.
3. Perform heat and smoke test to demonstrate that heat and smoke sensing devices and sprinkler heads are operable, and demonstrate results of operations to Owner's personnel.

3.4 DEMONSTRATION

A. Demonstration and Instruction of Owner’s Personnel:
1. Perform in accordance with Section 017500.
2. Demonstrate use and safety features to Owner's personnel.
3. Operate doors, locks and interlock system to demonstrate that hardware is adjusted and electrical wiring is connected correctly.
4. Operate sanitizing equipment through one complete cycle of use and clean-up, and demonstrate replenishment of chemicals or cleaning fluids in container of unit.
5. Provide heat and smoke test to demonstrate that heat and smoke sensing devices and sprinkler heads are operable, and demonstrate results of operations to Owner's personnel.

END OF SECTION

SECTION 149182

TRASH CHUTES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Trash chutes, intakes, discharge, floor frames, sprinklers, vent and attendant accessories.
   2. Optional equipment.

B. Related Sections:
   1. Section 078400 - Firestopping: Firestops
   2. Division 21 – Fire Suppression: Supply connections and services to fire sprinkler heads.
   3. Division 22 – Plumbing: Supply connections and services to sanitizer.
   4. Division 26 - Electrical: Service, interlock wiring and conduit.

1.2 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Provide trash and rubbish removal system complete with vertical chute, intake doors, discharge door, access doors, sprinkler heads, flushing heads, roof termination vent and flashing assembly.
   3. Provide for fire safing at floor penetrations, expansion/contraction and installation complying with required codes and ordinances.

1.3 SUBMITTALS

A. General: Submit in accordance with Section 013300.

B. Product Data: Submit product data for trash chutes.

C. Shop Drawings:
   1. Submit shop drawings for trash chutes.
   2. Indicate dimensions and details for:
      a. Typical floor plans.
      b. Chute fabrication and connections details, including intake, access and discharge door assemblies.
      c. Finishes and material thickness.
      d. Floor support.
      e. Venting, including roof counterflashing and curb.
      f. Isolation and clearances.
      g. Piping connections and locations for fire sprinklers and sanitizer.
      h. Distinguish between factory fabrication and field assembly.

D. Informational Submittals: Submit the following:
   1. Qualification Data: Manufacturer's and installer's qualification data.
   2. Manufacturer's instructions.
   3. Certification: Submit certifications specified in Quality Assurance article.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Provide trash chute components from same manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.

C. Installer Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.

D. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 016000.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. American Chute Systems, Joliet, IL.
   2. Chutes International, White Plains, MD.
   3. Midland Chutes, Schiller Park, IL.
   4. Valiant Products, Lakeland, FL.
   5. Western Chutes, Covina, CA.

2.2 MATERIALS AND COMPONENTS

A. Chute:
   1. Size: 24 inch inside diameter.
   2. Material: 16 gage aluminized steel.
   3. Automatic flushing and cleaning system.
   4. Disinfecting and sanitizing unit.
   5. Sound isolation:
      a. Factory spray coat chute with sound dampening material.
      b. Minimum thickness: 1/16 inch.
      c. Material: Damping Compound Type KDC-E-162, Kinetic Noise Control.
      d. Vibration control isolators for chute support floor frames.
      e. Product: Type BR, Mason Industries.
   6. Automatic on-off sprinklers.
   7. Smoke detectors.
   8. Heat detectors.

B. Intake Doors:
   1. Type: Bottom hinged hopper.
   2. Size: 15 inches wide by 18 inches high, compatible with chute diameter.
   3. Operation: Hand pull, self-closing with fire-rated latching device.
   4. Hinge: Heavy-duty piano type.
   5. Material:
      a. Front: 20 gage, UNS S30400 stainless steel, complying with ASTM A240.
      b. Back and wings: 18 gage aluminized steel.
   6. Finish: No. 3 polish.
   7. Trim: 20 gage stainless steel, match door finish.
   8. Label: 1-1/2 hour 250 degree UL "B" label.
   9. Embossed name plate with RUBBISH across top of door.

C. Discharge Door:
   1. Size: Compatible with chute diameter.
   2. Type: Direct discharge, horizontal sliding with wheel rollers on inclined steel track [Side discharge, top-hinged hopper with impact plate and bottom drain], spring-loaded, self-closing with 165 degree fusible link.
   3. Material: 12 gage galvanized steel.
   4. "B" label construction.

D. Roof Vent:
   1. Same size and material as chute.
   2. Extend to 4 feet above roof level.
   3. Provide full diameter screened vent area.
   4. Metal explosion-release, safety, weather cap.
   5. Flashing collar, compatible with chute metal.

E. Support Assemblies:
   1. Structural steel grid floor frames: 1-1/2 by 1-1/2 by 3/16 inch angles.
   2. Support clips: 1-1/2 by 3/16 inch bar stock, factory welded to chute.

F. Access Doors:
   1. Size, material, finish and label: Match intake doors.
   2. Locations: As required for access to valves, controls and sprinkler heads within chute.

G. Accessories:
   1. Fire sprinkler heads:
      a. Location: Above top intake door and above intake doors at alternate floors below.
      b. Size: 1/2 IPS with fusible link.
      c. Comply with NFPA 13.
   2. Flushing head:
      a. Location: Above top intake door.
      b. Size: 1/2 IPS connected to remote disinfecting/sanitizing unit.
   3. Provide fasteners and other accessories necessary to complete chute assembly and installation.

2.3 FABRICATION

A. General:
   1. Fabricate trash chute to comply with NFPA 82.
   2. Factory fabricate and assemble trash chute in sections for shipment to site.

B. Chute:
   1. Fully factory assemble, including intake, discharge and access doors.
   2. Mate chute sections to fit inside sections below.
   3. Weld or lock-seam tight joints except those required to separate sections for shipment and installation at site.
   4. Do not allow bolts, clips or other projections inside chute to prevent snag of flowing material.

C. Intake, Discharge and Access Doors:
   1. Fully factory fabricate and assemble.
   2. Bolt doors to throat formed by chute tube.
   3. Slot mounting holes to allow on-site adjustment.

D. Support Assemblies: Pre-position floor frames and factory weld support clips to chute sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017300.

3.2 INSTALLATION

A. Install trash chute in accordance with Section 017300 and approved shop drawings.

B. Install trash chute at location indicated.

C. Assemble and install components and sections plumb, level and square with tight, non-leaking joints.

D. Support trash chutes from floor construction only using seismically rated neoprene vibration isolation mounts. Do not anchor to wall assemblies. Anchor securely to floor structure with suitable and sufficient vibration isolation mounts to withstand impacts from uses and wind loading stresses on vent unit.

E. Provide for thermal expansion movement of chute sections between support points.

F. Provide and secure firestopping as specified in Section 078400 in space between chute wall and each floor or roof deck penetration prior to installation of chute enclosure walls.

G. Install sprinklers where indicated in chute. Coordinate sprinklers with plumbing specified in Division 22.

H. Install vent flashing in accordance with manufacturer's recommendations for roof conditions encountered.

I. Install sanitizer unit; cut and patch chute wall only to extent necessary for installation. Maintain fire-resistive construction. Interconnect sanitizer control with door interlock system.

J. Install electrical conduit, wiring and controls for operation of interlock system, heat control devices and smoke detector. Comply with applicable portions of electrical code.

K. Do not puncture, dent or otherwise damage chute sections or intakes.

L. Install accessory devices necessary for complete installation.

3.3 FIELD QUALITY CONTROL

A. Test operate components of chute system upon completion of installation.

3.4 DEMONSTRATION

A. Perform in accordance with Section 017500.

B. Demonstrate use and safety features to Owner's personnel.

C. Operate doors, locks and interlock system to demonstrate that hardware is adjusted and electrical wiring is connected correctly.

D. Operate sanitizing equipment through one complete cycle of use and clean-up, and demonstrate replenishment of chemicals or cleaning fluids in container of unit.

E. Provide heat and smoke test to demonstrate that heat and smoke sensing devices and sprinkler heads are operable, and demonstrate results of operations to Owner's personnel.

END OF SECTION