CSI: AUTOMOTIVE/AGRICULTURAL DIESEL MECHANICS FACILITY

DIVISION OF PUBLIC WORKS PROJECT NO. 22091

99% CD SET
VOLUME 1 OF 2
DIVISIONS 01 THROUGH 14

CLIENT AGENCY:
COLLEGE OF SOUTHERN IDAHO
315 FALLS AVE.
TWIN FALLS, ID 83301

CONTRACTING AGENCY:
DIVISION OF PUBLIC WORKS
504 N 4TH STREET
P.O. BOX 83720
BOISE, ID 83720-0072

PREPARED BY:

INTEGRUS
A COLLABORATION OF YGH & INTEGRUS ARCHITECTURE

10 SOUTH CEDAR STREET
SPOKANE, WA 99201
INTEGRUS PROJECT NO. 22220.00

JANUARY 2024

Agency Construction Approval #1 for Agency Construction Approval
2022091 - 2022091 CSI: Automotive/Agricultural Diesel Mechanics Facility, 315 Falls Ave, Twin Falls, ID 83303 USA
Tuesday, Feb 06, 2024

Agency Construction Approval

CONSTRUCTION APPROVAL BY RESPONSIBLE CHIEF OFFICER OF INSTITUTION OR AGENCY	
(IDAHO CODE 67-5710)	
Final Plans & Specs have been Reviewed for:	2022091 CSI: Automotive/Agricultural Diesel Mechanics Facility
DPW Project No:	2022091
This project incorporates the required program elements within the funding limitations authorized, and authorize the Division of Public Works to proceed with bidding of the project. If acceptable bids are received, I will approve awarding a contract and construction of the facilities in accordance with the plans and specifications.	
Agency:	CSI
Agency Signature Authority:	Jeff Harmon

Approval (Approved)

Role	Jeff Harmon (Agency - Signature Authority) Approved Jan 31, 2024 02:43 PM MST
Role	Margie Kennedy (Project Manager) Approved Feb 05, 2024 11:20 AM MST
Role	Margie Kennedy (SR PM) (Project Manager Senior) Approved Feb 05, 2024 11:28 AM MST
Role	Pat Donaldson (DPW Administrator) Approved Feb 06, 2024 12:39 PM MST

CONTENTS

VOLUME 1 OF 2

MANUFACTURER'S CERTIFICATION

The undersigned roofing manufacturer hereby certifies that he has reviewed the drawings, specifications and conditions of the site and the terms of the roofing guarantee included in the specification and find them acceptable, and if the manufacturer's materials are installed on the project in accordance with the drawings and specifications and upon inspection by the manufacturer's technical representative, manufacturer will issue the guarantee in the form specified.

DATED THIS _____ DAY OF _____ 20___

_____
(MANUFACTURER)

_____
(AUTHORIZED REPRESENTATIVE)

EXCEPTIONS: Subject to the following exceptions and or modification, (attach any details or added verbiage that is required) the undersigned roofing manufacturer will certify to the conditions stated above:

_____
_____
_____
_____
_____

DATED THIS_____ Day of _____ 20____

_____
(MANUFACTURER)

_____
(AUTHORIZED REPRESENTATIVE)

APPROVED APPLICATORS: The following roofing contractors are approved applicators of the roofing system specified (or approved) and as manufactured by the above named manufacturer:

NAME	ADDRESS

ROOFING MATERIALS SUBSTITUTION REQUEST FORM

(Submit not less than ten (10) days prior to bid date)

DPW Project No. _____

TO: (Architect)

We hereby submit for your consideration the following products in lieu of those specified for the above referenced project:

MATERIAL	SPECIFIED	PROPOSED SUBSTITUTION
Vapor Barrier		
Roof Insulation		
Roofing Membrane		
Surfacing		

Description of Proposed Components: _____

Differences between specified and proposed components including type of insulation, method of anchoring, details, surfacing, application methods, etc. _____

Attach complete technical data, including manufacturer's published specifications, standard details, laboratory tests and certifications, material samples and similar information to fully describe the products and methods of application.

If changes are required in specifications, drawings or details, provide revised specifications and details for consideration.

Answer the following:

1. Does proposed substitution affect details or dimensions shown on the drawings?
   _____YES _____NO

2. Will proposed substitution meet specified Underwriters Laboratory and ICBO ratings?
   _____YES _____NO

3. Is insulation and roofing method of attachment listed with Factory Mutual against wind loss?
   _____YES _____NO

4. Are all components of the roofing system (vapor barrier, insulation, fasteners, membrane components, flashings and surfacing) manufactured by or acceptable to the roofing manufacturer?
   _____YES _____NO

5. Will the manufacturer's authorized representative sign the Manufacturer's Certification included in the specification?
   _____YES _____NO

The undersigned manufacturer's representative states that the above information is true and correct, and that the proposed materials function, appearance and quality are equivalent or superior to the specified materials.

_____
(Manufacturer)

_____
(Manufacturer's Representative)

_____
(Address)

_____
(Signature)

_____
(Date)

END OF ROOFING MATERIALS SUBSTITUTION REQUEST FORM

Technical Specifications

DIVISION 01 GENERAL CONDITIONS

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Permits.
7. Waste Disposal.
8. Testing and Inspection.
9. Specification and drawing conventions.

B. Related Requirements:
1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: DPW #22091 Agricultural Diesel Mechanics Facility.
1. Project Location: Twin Falls, Idaho.

B. Owner: Division of Public Works, P.O. Box 83720, Boise, ID 83720-0072.
1. Owner's Representative: Margie Kennedy, Project Manager, (509) 838-8681

C. Agency: College of Southern Idaho
1. Agency's Representative: Jeff Harmon, CFO
2. Project Manager: Theo Schut, Senior Construction Project Manager (208) 732-6610

D. Architect or Engineer (Design Professional): Integrus Architecture, 10 S. Cedar, Spokane, WA 99201, (509) 838-2194.

E. Architect's or Engineer’s (Design Professional’s) Consultants: The Architect or Engineer has retained the following design professionals who have prepared designated portions of the Contract Documents:
1. Associate Architect: Myers Anderson Architects, 122 S. Main Street, Ste. 1, Pocatello, ID 83204, (208) 232-3741.

2. Mechanical Engineer: MW Engineers, 601 W. 1st Ave, #1300, Spokane, WA 99201, (508) 838-9020.
3. Electrical Engineer: Musgrove Engineering, 645 W 25th Street, Idaho Falls, ID 83402 (208) 523-2862
4. Site/Civil Engineer: Keller Associates, Inc. 100 E. Bower St., Meridian, ID 83642, (208) 288-1992.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. A description of the work of this project can be summarized to include a new, approximately 28,000 gross square feet building. Uses within the building will include shops, instructional labs, classrooms, faculty offices, and storage areas to support the diesel programs of CSI's Trade and Industry Division. Programs planned to make the initial move include Diesel Technology, Heavy Equipment Agricultural Diesel Technology, and Mobile Freight Liner Training.

1.5 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project, and by use of facility by building tenants in existing tenant improvement Projects.

B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Limits: Confine construction operations to construction limits indicated on drawings.
   2. Driveways, Walkways and Entrances: Keep driveways loading areas, etc. and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a) Schedule deliveries to minimize use of driveways and entrances by construction operations.
      b) Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
      c) Contractor parking shall be limited to those areas indicated on the Contract Document and as designed by the Owner.
      d) Maintain clear access to project at all times for firefighting equipment. Maintain exit ways from existing building required by authorities having jurisdiction.
      e) Signs: Provide signs adequate to direct visitors.
         (1) Do not install, or allow to be installed, signs other than specified sign(s) and signs identifying the principal entities involved in the project.

C. Security: The contractor shall maintain security of the building and any staging areas throughout the project.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
   1. Weekend Hours: Not allowed unless prior approval granted.
   2. Early Morning or Late Evening Hours: Provide notice and coordinate with Owner 72 hours in advance.
   3. Hours for Utility Shutdowns: Not allowed unless prior approval granted.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify Owner not less than 72 hours in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
   1. Notify Owner not less than 24 hours in advance of proposed disruptive operations.

E. Hazardous Materials: Notify the Design Professional and Owner immediately upon discovery of existing hazardous materials.

F. Nonsmoking Building: Smoking is not permitted within the building or on CSI campus.

G. Controlled Substances: Use of tobacco products and other controlled substances is not permitted per Section 72-1717, Idaho Code.

H. Contractor Parking: Coordinate with CSI and obtain contractor’s parking permits.

I. On Owner/Tenant occupied projects, maintain cleanliness in areas adjacent to and surrounding the construction area to the satisfaction of the Owner at all times.

J. On Owner/Tenant occupied projects, ensure deliveries and contractor work access are in accordance with previous agreement with Owner and/or as indicated in the Contract Documents.

1.7 PERMITS

A. Furnish all necessary permits for construction of the Work.

1.8 WASTE DISPOSAL

A. The contractor is responsible for any and all demolition and/or removal as necessary and required to fulfill the requirements of the Contract Documents.

1.9 TESTING AND INSPECTION

A. Notify Owner/Engineer at least 24 hours prior to commencement of Work requiring special inspection.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
   3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 23 00

ADD ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Add Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
   2. The cost for each alternate is the net addition to the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Add Alternate No. 1: Storefront Systems
   1. Base Bid: No Storefront.

2. Add Alternate: Storefront system at north on-road diesel shop wall centered above overhead door 124H. Includes providing and installing all structure required by manufacturer and translucent film.

B. Add Alternate No. 2: Movable Wall Partition
1. Base Bid: Includes all work associated with framed wall at grid line A2 to separate commons and classroom spaces. Base bid includes all finishes, structural members and electrical rough ins to allow for future installation of a movable wall partition.

2. Add Alternate: Includes providing and installing the movable wall partition, track, associated hardware, both end pocket framing, and soffit framing as indicated in Classroom 103.

C. Add Alternate No. 3: Canopy Shade Structure
1. Base Bid: No Canopy Shade.

2. Add Alternate: Includes providing all footing/foundations, concrete slab, power infrastructure, structure and MP-1 for a 20’ x 24’ canopy shade structure (2 layers with trim).

D. Add Alternate No. 4: Canal Pipe Structure
1. Base Bid: No Canal Pipe Structure.

2. Add Alternate: See Civil drawing sheets for information.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:
1. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.

g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.6 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
   1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue through contractor supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, through Owner's web-based management software (OMS). ASI may be completed on AIA Document G710, "Architect's Supplemental Instructions" and attached into OMS.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
   2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
   3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   4. Include costs of labor and supervision directly attributable to the change.
   5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
   6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
   7. Work Change Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, the Architect will complete the Owner’s Change Order Form and attach the Proposal Request and back-up. The Architect will then forward this documentation to the Owner’s Project Manager who will create a Change Order through OMS for approval of the Owner and Contractor. Note approval is determined after Change Order is approved through OMS.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Owner’s Representative may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment on DPW's Owners web-based management software (OMS).

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
   1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
   1. The Contractor will be given a DPW excel "schedule of values" spreadsheet to fill in the line items that pertain to the Project.
   2. Submit the schedule of values on DPW's excel "schedule of values" template to DPW along with bonds as a prerequisite to executing the contract.
   3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts where needed.
   4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   5. After review and approval by the Architect, DPW's Project Manager and DPW's Field Representative, the DPW Project Manager will upload the schedule of values excel template into DPW's Owner's web-based management software (OMS) "cost tracking-budget" module. This will create the construction contract. Any changes will now require a change order.
      a. Differentiate between items stored on-site and items stored off-site. Items must be stored on-site or in a bonded warehouse to receive payment.
   6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
   7. Retain one of two "Overhead Costs" subparagraphs below. Retain first subparagraph if overhead and profit are to be distributed proportionally to each line item. Owner's financial advisors may insist on this requirement. See the Evaluations for discussion on overhead distribution.
   8. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.

9. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five (5) percent of the Contract Sum and subcontract amount.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and all payments will be electronically approved by the Contractor, Architect, DPW Field Representative, DPW Project Manager, and DPW Senior Field Representative and paid for by Owner via Owners web-based management software. The schedule of values must be included and attached in OMS with the invoice.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Electronically upload Application for Payment to the Owners web-based management software by the end of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

D. Waivers of Mechanic's Lien: At the end of the project with the final Application for Payment, upload waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
   1. Upload partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, upload conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Upload final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
   5. Waiver Forms: Upload executed waivers of lien on forms acceptable to Owner.

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values.
   3. Contractor's construction schedule (preliminary if not final).
   4. Products list (preliminary if not final).
   5. Schedule of unit prices.
   6. Submittal schedule (preliminary if not final).
   7. Copies of building permits.
   8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   9. Initial progress report.
   10. Data needed to acquire Owner's insurance.

F. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, upload an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete. Retainage will still be held by the Owner.

G. Final Payment Application: After completing Project closeout requirements, submit final Payment Application with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Marked up Record Drawings and Specifications.
   3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   4. Contractor's Affidavit of Payment of Debts and Claims Form. AIA Document G706.
   5. Consent of Surety to Final Payment. AIA Document G707.
   6. Release of Claims form. Evidence that claims have been settled.
   7. Confirmation of all required training, product warranties, operating manuals, instruction manuals and other record documents, drawings and items customarily required of the Contractor.
   8. Public Works Contract Tax Release from the Idaho Tax Commission.
   9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   10. Final liquidated damages settlement statement.
   11. Any and all other items required by DPW under the applicable contract requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General coordination procedures.
   2. Coordination drawings.
   3. RFIs.
   4. Digital project management procedures.
   5. Project meetings.

B. Related Requirements:
   1. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Key Personnel Names: Within seven (7) days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

   1. Post copies of list in project meeting room, in temporary field office. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor's construction schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Processing of submittals.
   5. Progress meetings.
   6. Preinstallation conferences.
   7. Project closeout activities.
   8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
      c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
      e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
      f. Indicate required installation sequences.

g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Design Professional will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Design Professional determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Design Professional will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
11. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
   1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
   2. File Submittal Format: Submit or post coordination drawing files using PDF format.
   3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
      a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
      b. Digital Data Software Program: Drawings are available in AutoCad 2013.
      c. Contractor shall execute a data licensing agreement in the form of Agreement included in this Project Manual.

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and upload an RFI in the Owners web-based management software (OMS).
   1. Design Professional will approve RFIs with any comments through OMS.
   2. Design Professional shall notify DPW of the Design Professional's Representative who will receive and respond to RFIs.
   3. Contractor to upload RFIs in a prompt manner so as to avoid delays in the work or work of subcontractors.
   4. Contractor and Design Professional can copy any Team members the question and/or response within OMS.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Input information required by OMS.
   2. RFI subject.
   3. Specification Section number and title and related paragraphs, as appropriate.
   4. Drawing number and detail references, as appropriate.
   5. Field dimensions and conditions, as appropriate.
   6. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   7. Attachments: Upload sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
   1. The following Contractor-generated RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.
      c. Requests for approval of Contractor's means and methods.
      d. Requests for coordination information already indicated in the Contract Documents.
      e. Requests for adjustments in the Contract Time or the Contract Sum.
      f. Requests for interpretation of Architect's actions on submittals.
      g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to provide a PCO according to Section 01 26 00 "Contract Modification Procedures" to the Architect in writing.
    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within seven (7) days of receipt of the RFI response.

D. RFI Log: Use software log that is part of web-based Project software.

E. On receipt of Architect's action: Review response and notify Architect within seven (7) days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Architect's Data Files Not Available: Architect will provide Architect's CAD drawing digital data files for Contractor's use during construction.

B. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in AutoCad 2013.
4. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.
    a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement included in this Project Manual.
5. At Contractor’s written request, copies of Architect’s Electronic CAD files will be provided to Contractor for Contractor’s use in connection with the Project, subject to the following conditions:
    a. Electronic CAD Files of Project Drawings may only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
    b. The drawings cannot be used for any other project.
    c. The Architect’s title block must be removed by the Contractor. The Contractor becomes responsible for the content of the drawings.
        1) User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
    d. Use of files is solely at receiver's risk. Architect does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Architect of discrepancy and use information in hard-copy Drawings and Specifications.

1) CAD files may not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
2) Receiver shall not hold Architect/Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
3) Receiver shall understand that even though Architect/Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
4) Receiver shall not hold Architect/Engineer responsible for such viruses or their consequences, and shall hold Architect/Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

C. Web-Based Project Software: Use Owner's web-based management software site (OMS) for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project software site includes, at a minimum, the following features:
a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
c. Document workflow planning, allowing customization of workflow between project entities.
d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Proposed Change Orders, Construction Change Directives, and Change Orders.
e. Track status of each Project communication in real time, and log time and date when responses are provided.
f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
g. Processing and tracking of payment applications.
h. Processing and tracking of contract modifications.
i. Creating and distributing meeting minutes.
j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
k. Management of construction progress photographs.
l. Mobile device compatibility, including smartphones and tablets.
m. Management of daily field reports.

D. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

A. General: The Construction Manager will schedule, conduct meetings and conferences at Project site, and produce meeting minutes unless otherwise indicated.

B. Preconstruction Conference: The Owner will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect.
   1. Minutes: The Design Professional will be responsible for the meeting minutes and will record and distribute via the Owners web-based management software.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
   1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner of scheduled meeting dates.
   2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

      a. Contract Documents.
      b. Options.
      c. Related RFIs.
      d. Related Change Orders.
      e. Purchases.
      f. Deliveries.
      g. Submittals.
      h. Sustainable design requirements.
      i. Review of mockups.
      j. Possible conflicts.
      k. Compatibility requirements.
      l. Time schedules.
      m. Weather limitations.
      n. Manufacturer's written instructions.
      o. Warranty requirements.
      p. Compatibility of materials.
      q. Acceptability of substrates.
      r. Temporary facilities and controls.
      s. Space and access limitations.
      t. Regulations of authorities having jurisdiction.
      u. Testing and inspecting requirements.
      v. Installation procedures.
      w. Coordination with other work.
      x. Required performance results.
      y. Protection of adjacent work.
      z. Protection of construction and personnel.
   3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
   4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: The Design Professional will conduct progress meetings at monthly intervals.
   1. Coordinate dates of meetings with preparation of payment requests.
   2. Attendees: In addition to representatives of Owner, Agency, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
   3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
      a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
         1) Review schedule for next period.
      b. Review present and future needs of each entity present, including the following:
         1) Interface requirements.
         2) Sequence of operations.
         3) Resolution of BIM component conflicts.
         4) Status of submittals.
         5) Status of sustainable design documentation.
         6) Deliveries.
         7) Off-site fabrication.
         8) Access.
         9) Site use.
         10) Temporary facilities and controls.
         11) Progress cleaning.
         12) Quality and work standards.
         13) Status of correction of deficient items.
         14) Field observations.
         15) Status of RFIs.
         16) Status of Proposal Requests.
         17) Pending changes.
         18) Status of Change Orders.
         19) As-Built Updates.
         20) Pending claims and disputes.
         21) Documentation of information for payment requests.
   4. Minutes: Construction Manager responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
      a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
9. Category and type of submittal.

10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Submittals:

1. Upload Submittals on Owners web-based management software. Contractor to initiate the process via “Construction Management”, then “Submittal” tab within the website.

E. Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by Project software website.

1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
2. Samples: Prepare submittals and deliver to Architect.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow seven (7) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Resubmittal Review: Allow seven (7) days for review of each resubmittal.

D. Resubmittals: Make resubmittals in same form as initial submittal.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site, as needed. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

a. Project name and submittal number.
b. Generic description of Sample.
c. Product name and name of manufacturer.
d. Sample source.
e. Number and title of applicable Specification Section.
f. Specification paragraph number and generic name of each item.

3. Transmittal: Upload PDF transmittal to the Owners web based management software under submittals. Include digital image file illustrating Sample characteristics, and identification information for record.
4. Web-Based Project Software: Prepare submittals in PDF form, and upload to Owners web-based Project software website. Enter required data in web-based software site to fully identify submittal.
5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit two (2) full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing

color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three (3) sets of Samples. Architect will retain one sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests

performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.7 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before uploading to the Owners web based management software.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp that is indicated on the web-based submittal. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

    1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.8 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required within the “Comment” box on the web site.

    1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.

2. Submittals by Web-Based Project Software: Architect will indicate, on Project software website, the appropriate action.

    a. Actions taken by indication on Project software website have the following meanings:

        1) Approved, Pending, Overdue, Complete, or Rejected.

B. Informational Submittals: Architect will review each submittal and will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and -control services required by Design Professional, or Owner, or authorities having jurisdiction are not limited by provisions of this Section.
   4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by the Design Professional.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless

otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Design Professional for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable

limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Design Professional for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
   1. Indicate manufacturer and model number of individual components.
   2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
   1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Design Professional.
   2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Design Professional.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 15 days of Notice to Proceed and not less than 2 days prior to preconstruction conference. Submit in format acceptable to Design Professional. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
   1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
   1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
   2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
   3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Design Professional has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and re-inspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of factory-authorized service representative making report.
   2. Statement that equipment complies with requirements.
   3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   4. Statement whether conditions, products, and installation will affect warranty.
   5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those

performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   f. When testing is complete, remove test specimens, assemblies, and mock-ups; do not reuse products on Project unless authorized by the Design Professional.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Design Professional and Commissioning Authority with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services. These services, or special inspections, provided to the Owner are for the express purpose of meeting the testing requirements required under the authorities having jurisdiction and shall not in any way be considered to replace the Contractor's responsibility for quality assurance and control for the project.
   1. Contractor will coordinate and schedule all testing and special inspections with the Owner's testing agency.
   2. Under no circumstances will the Owner's testing agency perform quality control or quality assurance work for the Contractor.
   3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor**,** and the Contract Sum will be adjusted by Change Order.
   4. Initial reports (handwritten as a minimum) will be given to the Contractor by the Owner's testing Agency before leaving the site the day of the inspection.
   5. Final reports will be issued later to the Contractor, Design Professional, and Owner.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
   2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
      a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
   4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-

inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Owner, Design Professional, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Owner, Design Professional, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service to Owner, Design Professional, and Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Design Professional, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner as follows:

1. Schedule of Special Inspections by Owner: See individual specification sections for specific requirements.

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Owner, Design Professional, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Owner, Design Professional, and Contractor, and to authorities having jurisdiction if required.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Owner and Design Professional's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:
   1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Contractor will pay sewer-service use charges for sewer usage by all entities for construction operations.

1.3 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Moisture-and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.
   1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
   2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
   3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

C. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
   1. Locations of dust-control partitions at each phase of work.
   2. HVAC system isolation schematic drawing.

3. Location of proposed air-filtration system discharge.
4. Waste-handling procedures.
5. Other dust-control measures.
6. Noise control measures.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Design Professional, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.

3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
   1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
      a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
      b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
   2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
   3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
   1. Install electric power service overhead unless otherwise indicated.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
   2. Maintain support facilities until Design Professional schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
   1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
   1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
   2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 20 00 "Earth Moving."

3. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 32 12 16 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide (1) Project identification sign. Graphic to be designed and coordinated with Architect. Coordinate location of sign with design team prior to placing. Sign to be printed on laminated 4’-0” X 8’-0” plywood sheet, mounted on (2) 4x4 pressure treated posts buried in ground a minimum of 3’-0”.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
   a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touch up signs so they are legible at all times. Revise “Dewatering Facilities and Drains” Paragraph below to suit soil-conservation district requirements. See Evaluations. Consult soil engineer about expected ground water.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 31 10 00 "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
   1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
   2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
   3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
   4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

   1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

   1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
   2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
   3. Provide walk-off mats at each entrance through temporary partition.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
   2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of this Section Includes: General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

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

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

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product data.

B. Shop Drawings:
   1. Plans showing trees and plants to be protected, locations of protection-zone fencing and signage, and the relationship between equipment-movement routes and material storage locations with protection zones.

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

1.5 INFORMATIONAL SUBMITTALS

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

B. 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.

1.6 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in jurisdiction where Project is located, current member of ASCA, or registered Consulting Arborist as designated by ASCA.

1.7 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
1. Planting Soil: Planting soil as specified in Section 32 91 13 "Soil Preparation".

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.

C. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements: Previously used materials may be used when approved by Architect.
1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch-diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch-OD line posts, and 2-7/8-inch-OD corner and pull posts; with 1-5/8-inch-OD top rails and 0.177-inch-diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
a. Height: 48 inches.
2. Plywood Protection-Zone Fencing: Plywood framed with four 2-by-4-inch rails, with 4-by-4-inch preservative-treated wood posts spaced not more than 96 inches apart.
a. Height: 48 inches.

3. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches apart. Fencing is available in high-visibility orange color.

    a. Height: 48 inches.

4. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

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.

3.2 PREPARATION

A. 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.

3.3 TREE PROTECTION

A. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.
    1. Apply 2-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches tree trunks.
    2. Install temporary root protection matting over mulch to the extent indicated.

3.4 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected areas except by entrance gates.
    1. Chain-Link Fencing: Install to comply with ASTM F567 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 where indicated.
    4. Plastic Fencing: Stretch fabric taut and secure to posts without bows or sags.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect.

C. Maintain protection zones free of weeds and trash.

D. 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.

3.5 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones in accordance with requirements in Section 31 00 00 "Earthwork" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

3.6 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. 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. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
   3. Cover exposed roots with burlap and water regularly.
   4. Backfill as soon as possible in accordance with requirements in Section 31 20 00 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.7 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

   1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.

2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees in accordance with ANSI A300 (Part 1).

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

C. Do not paint or apply sealants to wounds.

3.8 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. 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.

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

3.9 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.10 REPAIR AND REPLACEMENT

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

1. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
2. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 01 25 00 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within seven (7) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

    a. Form of Architect's Approval of Submittal: As specified in Section 01 33 00 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: …"

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: …"

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

    a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: …"

4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.

    a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: …"

5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

    a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: …"

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.

    a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: …"

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in

"Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
2. Evidence that proposed product provides specified warranty.
3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
4. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Installation of the Work.
   3. Cutting and patching.
   4. Progress cleaning.
   5. Starting and adjusting.
   6. Protection of installed construction.

B. Related Requirements:
   1. Section 01 10 00 "Summary" for limits on use of Project site.

1.2 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
   1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
   2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
   3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
      a. Water, moisture, or vapor barriers.
      b. Membranes and flashings.
      c. Exterior curtain-wall construction.
      d. Sprayed fire-resistive material.
      e. Equipment supports.
      f. Piping, ductwork, vessels, and equipment.
      g. Noise- and vibration-control elements and systems.
   4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities.

Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
   a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
6. Dates: Indicate on the contractor's schedule when cutting and patching will be performed.

B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where

indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Design Professional when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of in occupied spaces and in unoccupied spaces, or as required by authorities having jurisdiction.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Remove and replace damaged, defective, or non-conforming Work.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 AGENCY-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner’s and Agency construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner and Agency construction personnel.
1. Construction Schedule: Inform Owner/Agency of Contractor's preferred construction schedule for Owner/Agency portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner/Agency in a timely manner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner/Agency construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner/Agency work. Attend preinstallation conferences conducted by Owner/Agency construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
      a. Use containers intended for holding waste materials of type to be stored.
   4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 13 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and general provisions of the Contract and other Division 01 Specification Sections apply to this Section.

B. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.

C. Related Requirements:
   1. Section 01 78 23 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
   2. Section 01 79 00 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at final completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Idaho Division of Public Works Close-Out requirements, including “Conditions Precedent to Final Payment” list. The “Project Finalization” form is required unless specifications indicate otherwise.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of seven (7) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
   3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
   5. Submit sustainable design submittals not previously submitted.
   6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
   7. A final report of Special Inspections to be attached to the Substantial Completion. If no Special Inspections are required, Design Professional can initial as such on the Substantial Completion form.
   8. Submit O&M Manuals for compliance with the contract documents.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of seven (7) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Advise Owner of pending insurance changeover requirements.
   2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   3. Complete startup and testing of systems and equipment.
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
   6. Advise Owner of changeover in utility services.
   7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
   8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   9. Complete final cleaning requirements.
   10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for final completion.

1.5 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
   1. Upload a final Application for Payment according to Section 012900 "Payment Procedures" to DPW's Construction Management Portal.
   2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
   3. Idaho Division of Public Works Close-Out requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will approve/initial punch list after inspection or will notify Contractor of construction that must be completed or corrected before final documents will be signed.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order.
   2. Retain the subparagraph below if default submittal format in Section 01 33 00 "Submittal Procedures" is not appropriate.
   3. Submit list of incomplete items in the following format:
      a. MS Excel electronic file. Architect will return annotated file.
      b. PDF electronic file. Architect will return annotated file.
      c. Web-based project software upload. Utilize software feature for creating and updating list of incomplete items (punch list).

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within ten (10) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks

enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit on digital media acceptable to Design Professional by uploading to web-based project software site.

E. Warranties in Paper Form:
   1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
   4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
      a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
      b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
    1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations, as well as any damage to surrounding areas. Repair includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition before requesting inspection for determination of Substantial Completion.
    1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
    2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
        a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

B. Repair, or remove and replace, defective construction.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory manuals.
   2. Emergency manuals.
   3. Systems and equipment operation manuals.
   4. Systems and equipment maintenance manuals.
   5. Product maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Architect and Agency will comment on whether content of operation and maintenance submittals is acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:
   1. Submit on digital media acceptable to Architect or by uploading to web-based project software site. Enable reviewer comments on draft submittals.
   2. Submit three paper copies. Architect will return two copies.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 7 (seven) days before commencing demonstration and training. Architect will return copy with comments.
   1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

D. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.3 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy: Submit manuals in the form of (2) hard-copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
2. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.4 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:
1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.5 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   3. Gas leak.
   4. Water leak.
   5. Power failure.
   6. Water outage.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures: Include the following, as applicable:
   1. Instructions on stopping.
   2. Shutdown instructions for each type of emergency.
   3. Operating instructions for conditions outside normal operating limits.
   4. Required sequences for electric or electronic systems.
   5. Special operating instructions and procedures.

1.6 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   6. Normal shutdown instructions.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.7 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds, as described below.

C. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
      a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

H. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1.8 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.

B. Related Requirements:
   1. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit one set(s) of marked-up record prints.
   2. Number of Copies: Submit copies of record Drawings as follows:
      a. Initial Submittal:
         1) Submit one paper-copy set(s) of marked-up record prints.
         2) Upload PDF electronic files of scanned record prints and one of file prints onto DPW's Owners Web-based Management Software.
         3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final Submittal:
         1) Submit one paper-copy set of marked-up record prints.
         2) Upload PDF electronic files of scanned record prints onto DPW's Owners Web-based Management Software.
         3) Architect will review for completeness.

B. Record Specifications: Submit one paper copy annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy annotated PDF electronic files and directories of each submittal.
   1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.3 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper or electronic copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Accurately record information in an acceptable drawing technique.
      c. Record data as soon as possible after obtaining it.
      d. Record and check the markup before enclosing concealed installations.
      e. Cross-reference record prints to corresponding photographic documentation.
   2. Content: Types of items requiring marking include, but are not limited to, the following:
      a. Dimensional changes to Drawings.
      b. Revisions to details shown on Drawings.
      c. Depths of foundations.
      d. Locations and depths of underground utilities.
      e. Revisions to routing of piping and conduits.
      f. Revisions to electrical circuitry.
      g. Actual equipment locations.
      h. Duct size and routing.
      i. Locations of concealed internal utilities.
      j. Changes made by Change Order or Construction Change Directive.
      k. Changes made following Architect's written orders.
      l. Details not on the original Contract Drawings.
      m. Field records for variable and concealed conditions.
      n. Record information on the Work that is shown only schematically.
   3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
   4. Mark record sets with colors to distinguish between changes for different categories of the Work at same location.
   5. Mark important additional information that was either shown schematically or omitted from original Drawings.
   6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
   1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
   2. Format: DWG, Version , Microsoft Windows operating system.
   3. Format: Annotated PDF electronic file with comment function enabled.
   4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
   5. Refer instances of uncertainty to Architect for resolution.

6. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
    a. See Section 01 31 00 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. If required, bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

1.4 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as paper copy or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

1.5 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

C. Format: Submit record Product Data as scanned PDF electronic file(s) of marked-up paper copy of Product Data.
   1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.6 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Instruction in operation and maintenance of systems, subsystems, and equipment.
   2. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit one copy (1) within seven (7) days of end of each training module.
   1. At completion of training, submit complete training manual(s) for Owner's use prepared in same format required for operation and maintenance manuals specified in Section 01 78 23 "Operation and Maintenance Data."

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.6 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
   1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
      a. System, subsystem, and equipment descriptions.
      b. Performance and design criteria if Contractor is delegated design responsibility.
      c. Operating standards.
      d. Regulatory requirements.
      e. Equipment function.
      f. Operating characteristics.
      g. Limiting conditions.
      h. Performance curves.
   2. Documentation: Review the following items in detail:
      a. Emergency manuals.
      b. Systems and equipment operation manuals.
      c. Systems and equipment maintenance manuals.
      d. Product maintenance manuals.
      e. Project Record Documents.
      f. Identification systems.
      g. Warranties and bonds.
      h. Maintenance service agreements and similar continuing commitments.
   3. Emergencies: Include the following, as applicable:
      a. Instructions on meaning of warnings, trouble indications, and error messages.
      b. Instructions on stopping.
      c. Shutdown instructions for each type of emergency.
      d. Operating instructions for conditions outside of normal operating limits.
      e. Sequences for electric or electronic systems.
      f. Special operating instructions and procedures.
   4. Operations: Include the following, as applicable:
      a. Startup procedures.
      b. Equipment or system break-in procedures.
      c. Routine and normal operating instructions.

d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

1.7 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner with at least ten (10) days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and remove from Project. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.9 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
   1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video.
   1. Submit video recordings on USB thumb drive.

C. Recording: Display continuous running time.

D. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION

RSECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Attention is directed to the printed form of Contract and General Conditions and Supplementary Conditions which are hereby made a part of this Section of the Specifications.

B. Furnish all labor, materials, equipment and services necessary to provide the owner with fully functional mechanical, electrical and plumbing systems.

C. Commissioning: Commissioning (Cx) is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet the defined objectives and criteria set by the Owners.

D. Commissioning Team: The members of the Cx team consist of the owner's contracted commissioning authority (CxA), the owner's representative or construction manager (CM), the general or prime contractor (GC), the architect (Arch) and the design engineers (Engs), the mechanical Contractors (MC), the electrical contractor (EC), the testing and balancing (TAB) contractor, the control contractor (CC), the facility operating staff, and any other subContractors or suppliers of equipment. The CxA directs and coordinates the project Cx activities and reports to the owner. All team members work together to fulfill their contracted responsibilities and meet the objectives of the contracted documents. Commissioning Shall:

1. Verify that applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations, and industry accepted minimum standards and that they receive adequate operational checkout by installing Contractors and the Commissioning Authority.
2. Verify and document proper performance of equipment and systems.
3. Verify that O&M documentation left on site is complete.
4. Verify that the owner's operating personnel are adequately trained.

E. The Cx process does not take away from or reduce the responsibility of the system designers or installing Contractors to provide a finished and fully functional product. Furthermore, it doesn't not remove any responsibilities, products or requirements of other specification sections.

F. GC is not required to provide the CxA. An independent, third-party commissioning agent has been retained by the State of Idaho. Though the contractor is not required to provide a commissioning agent, requirements for participation in the commissioning process are included in this specification.

G. The GC and appropriate subcontractors are required to fully coordinate all commissioning efforts as needed and indicated by the CxA.

1.2 REFERENCES

A. ASHRAE STANDARD 202-2018

B. IECC 2018

1.3 SUBMITTALS

A. Static Testing Forms as required in Division 22, 23 and 26 specifications

B. Manufacturer pre-startup and startup forms

C. Pre-functional testing forms (provided by Commissioning Authority populated by Contractors)

1.4 DESCRIPTION OF WORK

A. The work of this Section shall include and provide all labor, tools, materials and equipment necessary to produce fully functional MEP systems and for the CxA to verify installation and performance of the Mechanical, Plumbing and Electrical systems. The following systems shall be commissioned.

1. HVAC & Control Systems

2. Domestic Water Systems

3. Lighting & Control Systems

1.5 RELATED WORK IN OTHER SECTIONS

A. The following related work shall be furnished or performed under other Sections of these Specifications:

1. Section 019114 – COMMISSIONING PLAN

2. Section 220800 – COMMISSIONING OF DOMESTIC WATER SYSTEMS

3. Section 230800 – COMMISSIONING OF HVAC

4. Section 260800 – COMMISSIONING OF LIGHTING & CONTROLS

1.6 DEFINITIONS

A. Commissioning Plan: The detailed process of checking and testing procedures, sequences of events, schedules, staffing plans, and management or administrative procedures required to provide a comprehensive coordinated approach for commissioning the systems and equipment described herein.

B. CxA: Commissioning Authority. The main point of contact for the commissioning process and third-party technical representative of the owner. The Commissioning Authority will manage all commissioning activities on behalf of the Owner and will serve as the Owner's agent in review and approval of commissioning related services.

C. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

D. Commissioning Manager: The Commissioning Representative of the Contractor and/or commissioning team, to manage and lead the commissioning effort on behalf of the Contractor and/or commissioning team.

E. Commissioning Procedures: A series of checks, tests, and operational procedures, applied in specific sequences, to each system or equipment component to be commissioned and intended to demonstrate full system installation, performance, and functionality, in accordance with the design intent. The term "procedures" shall be used throughout this specification and the Project Commissioning Plan in reference to these checking, testing, and operational procedures.

F. Systems Pre-Functional Test: A test, or tests, of the static function and operation of equipment and systems using manual (direct observation) by the installing contractor prior, during and post-equipment startup as deemed appropriate. Systems Pre-Functional Performance Testing is meant to verify the as-built systems ability to operate trouble free in at least a limited fashion prior to TAB and Systems Functional Performance testing. This process is documented through population of the provided pre-functional checklists.

G. Systems Functional Performance Test: A test, or tests, of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods meant to commence following the completion of TAB and Systems Pre-Functional Testing. Systems Functional Performance Testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint) performed by the Commissioning Agent with support from the contractor as needed. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not considered Systems Functional Performance Testing. TAB's primary work is setting up the system flows and pressures as specified, while System Functional Performance Testing is verifying that the system has already been set up properly and is functioning in accordance with the Construction Documents. The Commissioning Agent develops the Systems Functional Performance Test Procedures in a sequential written form, coordinates, witnesses, and documents the actual testing. Systems Functional Performance Testing is performed by the Contractor. Systems Functional Performance Tests

are performed after startups, control systems are complete and operational, TAB functions and Pre-Functional Checklists are complete.

1.7 INTENT

A. It is the intention of this Specification is to require the Contractors performing work to cooperate with the CxA, to furnish labor and equipment and measuring devices as needed, to perform required measurements and tests to verify that the installed equipment and systems are performing in accordance with the construction documents.

B. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating or construction management.

C. HVAC system installation, start-up, testing and balancing, preparation of O&M manuals, and operator training are the responsibility of the HVAC Contractor, with coordination by the General Contractor, Construction Manager or other entity acting under the requirements of Division 1. Observation, verification and testing are the responsibility of the CxA who is to be assisted by installing Contractors as needed. The Cx process does not relieve Contractors from the obligations to complete all portions of work in a satisfactory and fully operational manner, nor does Cx remove any obligation the trades have for operation and maintenance manuals and training.

D. Plumbing system installation, equipment start-up, testing and balancing, preparation of O&M manuals, and operator training are the responsibility of the Plumbing Contractor, with coordination by the General Contractor, Construction Manager or other entity acting under the requirements of Division 1. Observation, verification and functional testing are the responsibility of the CxA who is to be assisted by installing Contractors as needed. The Cx process does not relieve Contractors from the obligations to complete all portions of work in a satisfactory and fully operational manner, nor does Cx remove any obligation the trades have for operation and maintenance manuals and training.

1.8 GC REQUIREMENTS

A. Cx, Pre-Functional and Functional testing as defined by ASHRAE standard 202-2018 are mandatory requirements of this project. All equipment and systems installed in connection with the section listed above shall be put in operation in the presence of duly authorized representatives with 48-hour notice given to the CxA. GC and subcontractors to provide any assistance needed to fully test systems in accordance with testing protocols.

B. All applicable equipment submittals shall be forwarded to the CxA for review.

C. GC shall sign-off on all CxA site visits, whether or not Contractors meet their commitments with regard to inspection and testing.

D. Record installation progress of systems to be commissioned. Notify CxA of manufacturer startup dates.

E. Schedule and chair the pre-commissioning work session and the kickoff meetings in collaboration with the CxA.

F. Include all commissioning activities in project schedule.

G. Schedule TAB work in coordination with mechanical contractor.

H. Maintain commissioning related submittal checklist as provided by the CxA.

I. No Functional Testing shall commence until the completion and submission of the populated pre-functional checklists to the CxA. The CxA will provide blank pre-functional testing forms for the mechanical contractor to populate. Populated Pre-functional testing forms shall be provided to the GC by the installing contractor. GC shall check forms for clarity and completeness prior to final submittal to the CxA.

J. No Functional Testing shall commence until all systems TAB is complete. Functional testing may commence, at the discretion of the CxA, once TAB is complete however only conditional acceptance can be achieved until the final TAB report is provided by the contractor to the CxA for review. Only after review and acceptance of the TAB report and tested values can final acceptance be achieved. The owner may elect to wait until final acceptance is achieved to consider the project substantially complete. Though the TAB contractor is provided by the State of Idaho, the GC shall schedule and facilitate all TAB work relative to master project schedule and prior to completion of Commissioning.

K. GC shall provide 48-hour notice via email or phone-call prior for functional testing but only after all commissioning related submittals have been approved by the CxA.

1.9 RESPONSIBILITIES OF THE HVAC & CONTROLS CONTRACTORS

A. Refer to section 23 08 00

1.10 RESPONSIBILITIES OF PLUMBING CONTRACTORS

A. Refer to section 22 08 00

1.11 RESPONSIBILITIES OF THE TAB CONTRACTOR

A. Refer to division 23 specifications

1.12 RESPONSIBILITY OF THE OWNER

A. Provide the OPR documentation (if applicable) to the CxA and the Cx Team for use in developing the Cx plan; systems manual; operation and maintenance training plan; and testing plans and checklists

B. Assign operation and maintenance personnel and schedule them to participate in Cx team activities including, but not limited to, the following:

1. Coordination, pre-commissioning and kickoff Meetings

2. Training in operation and maintenance of systems, subsystems, and equipment.

3. Testing meetings.

4. Demonstration of operation of systems, subsystems, and equipment.

C. Provide utility services required for the Cx process.

D. Provide the BOD documents (if applicable), prepared by Architect and approved by Owner, to the CxA and the Cx Team for use in developing or updating the Cx plan, systems manual, and operation and maintenance training plan.

1.13 RESPONSIBILITY OF THE THIRD-PARTY COMMISSIONING AUTHORITY

A. Organize and lead the Cx team.

B. Prepare a construction-phase Cx plan, based on specification section 01 91 14. Collaborate with Contractors and with subContractors to develop test and verification procedures. Include design changes and scheduled Cx activities coordinated with overall Project schedule. Identify Cx team member responsibilities, by name, firm, and trade specialty, for performance of each Cx task.

C. Review and comment on submittals from Contractors for compliance with the OPR, BOD, Contract Documents, and construction-phase Cx plan. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the OPR and BOD.

D. Convene Cx team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the Cx processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The CxA shall prepare and distribute minutes to Cx team members and attendees within five workdays of the Cx meeting.

E. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the Cx activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; and Project completion.

F. Observe and verify construction and report progress and deficiencies. In addition to compliance with the OPR, BOD, and Contract Documents, verify systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.

G. Prepare project-specific test and verification procedures and checklists.

H. Schedule, direct, witness, and document tests and verifications.

I. Compile test data, verification reports, and certificates and include them in the Cx report.

J. Develop custom pre-functional and functional testing protocol for review by interested parties.

K. Perform functional testing with assistance by appropriate contractors

L. Certify date of acceptance and startup for each item of equipment for start of warranty periods.

M. Review project record documents for accuracy. Request revisions from Contractor to achieve accuracy.

N. Review and comment on contractor submitted operation and maintenance documentation and systems manual outline for compliance with the OPR, BOD, and Contract Documents.

O. Review operation and maintenance training program and provide assessment and feedback on the completeness of the maintenance training program requirements. Operation and maintenance training is specified in contract documents

P. Assemble the final Cx documentation, including the Cx report and Project Record Documents.

1.14 SYSTEMS TO BE COMMISSIONED

A. HVAC System

1. Makeup Air Systems

2. Air Handling Systems

3. Exhaust Fans

4. Destratification Fans

5. Boilers

6. Pumps

7. Terminal Units, re-heat water coils, valves, actuators and controls.

8. General Hydronic and Airside Systems infrastructure including piping, ductwork, insulation, fittings, etc.

9. Unit Heaters

10. Local and DDC based controls

11. Installation Quality

12. Overall HVAC Functionality

B. Domestic Water Systems System

1. Water Heaters & Storage Tanks

2. Recirculation Pumps

3. General infrastructure including piping, insulation, fittings, etc.

4. Local control

5. Installation Quality

6. Overall Functionality

C. Lighting and Controls System

1. Interior Lighting Fixtures

2. Exterior Lighting Fixtures

3. Central and Local Control of Interior and Exterior Lighting

4. Installation Quality

5. Overall Functionality

D. No Functional Testing shall commence until all manufacturer startup, CxA supplied Prefunctional Checklists and TAB reports are completed and returned to the CxA.

1.15 RECORD DRAWINGS

A. Record drawings shall be kept on the job site and up dated continuously by the Contractor as the work progresses

B. Record drawings shall show exact locations and sizes of all the work to be concealed. Especially note the location of the valves, volume dampers, fire dampers, etc.

C. Non-availability of the updated record drawings or inaccuracies therein shall be grounds for cancellation and/or postponement of any final verification or testing.

1.13 COMMISSIONING APPROACH

A. General - Construction

1. The commissioning approach shall include a series of checks, tests, and operational procedures, applied in specific sequences, to each system or equipment component to be commissioned.

2. The contractor shall perform startup tests in accordance with manufacturer's requirements and pre-functional testing in accordance with Commissioning Authority supplied checklists utilizing members of the construction staff and representatives of the equipment and system manufacturer's who are fully knowledgeable of the equipment and systems installation and operation.

3. The contractor is required to fill out the pre-functional testing forms provided by the Commissioning Agent. The Commissioning agent may observe certain pre-functional tests and their discretion.

4. The specific commissioning procedures required are described in the Project Commissioning plan and or checklists. These procedures shall be performed in a specific sequence as described in the Project Commissioning Plan. The sequenced application of the procedures is intended to provide a step-wise development, proceeding from the individual component level, to the system level, and ultimately to the multiple integrated level of system operation. This sequencing approach will require certain procedures to be performed earlier in the construction process than for non-commissioned construction, and is intended to help ensure that the installation is free of defects at the earliest opportunity, allowing increased time for correction or modification if defects or performance issues are found.

B. Process Management

1. The Contractor's Commissioning Manager shall be responsible for the overall management of the commissioning process as well as the specific scheduling of all procedures to provide the sequenced application of the procedures. The Contractor shall be responsible for the provision of all staff necessary, tools and instrumentation, and coordination of the work, to provide an integrated and fully coordinated commissioning service.

2. Prior to the start of mechanical or electrical system installation, the Contractor shall designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort on behalf of the Contractor. The Contractor's appointed commissioning manager shall be experienced in all aspects of the construction process and in the application and management of commissioning processes. The CxM shall provide a single point of contact and communications for all commissioning related services. The Contractor shall grant the CxM sufficient authority to manage and direct the construction staff and sub-contractors in the provision of commissioning work, to accept and provide minor changes to the work on behalf of the Contractor, and to speak on behalf of the Contractor in all commissioning related contractual matters.

3. Prior to the start of mechanical or electrical system installation, the Contractor shall designate specific individuals as commissioning representatives (CxR) for each construction trade to be associated with commissioning work. The commissioning representatives shall participate in the commissioning process as team members participating in commissioning testing services, equipment operation, adjustments, and corrections if necessary. All CxRs shall be selected as individuals having sufficient authority to direct their respective staff to provide the services required, accept and provide minor changes to the work on behalf of the subcontractors or various organizations involved, and to speak on behalf of their organizations in all commissioning related contractual matters.

4. All commissioning procedures are intended to be witnessed by representatives of the Owner and of the Architect. Representatives of the Owner will typically include the CxA and representatives of the facilities operations and maintenance staff, and representatives of the building users. The Owner will designate the specific individuals to be involved in the commissioning process and will designate a single individual, as the Owner's primary representative, to serve as a single point of contact for commissioning related communication and scheduling. This individual will be designated as the Owner's Commissioning Agent (OxA).

5. Depending on the specific system commissioned and the specific procedure, representatives of the Architect may include a variety of individuals including engineers representing the design team, field observation and administration staff, and the Architect's commissioning representative (CxA)

6. The Architect's representative will be designated as the Commissioning Authority (CxA) and will manage all commissioning activities on behalf of the Architect and will serve as the Owner's agent in review and approval of commissioning related services. The CxA will serve as the Architect's single point of contact for commissioning related communication and scheduling. The CxA will additionally be responsible for interpretation of the commissioning Contract Documents on behalf of the Architect and the Owner. The CxA or designated representative will attend all commissioning related activities and procedures.

1.14 COMMISSIONING PLAN

A. Prior to the start of construction of any system required to be provided with commissioning services, the Commissioning Authority shall update detailed commissioning plan found in specification section 01 91 14 as appropriate.

B. The commissioning plan shall detail the overall approach to commissioning, team organization, sequence and scheduling of activities, checks, tests, and procedures to be employed, coordination and integration of Owner training, methods of team communication and record keeping, and coordination with construction activities required in other Sections of the Project Specifications.

C. The Commissioning Authority shall construct and format the commissioning plan utilizing the Project Commissioning Plan organization and format provided. All

Information, procedures, forms, drawings, and system descriptions provided in the Project Commissioning Plan may be reproduced, modified, and utilized by the Contractor, as determined appropriate by the Contractor, and for the sole purpose as use in the development of documentation required by these Contract Documents. The Project Commissioning Plan will be provided to the Contractor as electronic files via email or electronic submittal and separately as a hard copy document.

D. The commissioning plan, and all subsequent revisions to the plan provided during the construction process, shall be provided by the CxA in hard copy and in electronic media form utilizing the same computer programs and the same, or later, program version numbers. Plan information and development added to the plan by the Contractor, and not available or included in the Project Commissioning Plan, shall be provided through the application of the same computer programs unless such program is not relevant to the specific aspect of the plan.

E. Detailed project scheduling information may be provided in the computer program and format preferred by the Contractor, or may be provided as hard copy only, if a computerized scheduling program is not utilized by the Contractor.

PART 2 - PRODUCTS

2.1 Test Equipment

A. Each subcontractor shall furnish all the equipment and labor to test the systems and equipment installed under their section. For example, the mechanical and electrical Contractors shall ultimately be responsible for all standard testing equipment for the mechanical, controls systems, plumbing systems except for equipment specific to and used by TAB in their Cx responsibilities.

B. Stand-alone datalogging equipment shall be provided by the CxA as needed.

C. BMS/DDC tied datalogging equipment and software can be used for Cx at the discretion of the CxA and shall be considered the property of the Owner.

D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available where applicable.

E. Refer to the Cx Plan for details regarding equipment that may be required to simulate required test conditions.

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Contractors shall provide submittal documentation for systems to be commissioned indicated herein and in the Cx Plan.

B. Contractor shall provide static testing results as required in division 22,23 and 26 sections.

C. Contractor shall provide populated manufacturer startup checklists.

D. Contractor shall provide populated prefunctional checklists.

3.2 PRE-COMMISSIONING WORK SESSION & KICKOFF MEETING

A. The GC shall schedule and chair a pre-commissioning work session to review the CxA's developing Commissioning Plan. The work session shall be held prior to HVAC rough-in.

B. The work session shall be held at the Contractor's principle place of business or at the job site. The GC, CxA, appropriate subcontractors and representatives of the owner shall be scheduled for attendance as a minimum. Sub-contractor representatives of the principle trades involved in the commissioning process should also be in attendance and may be scheduled for attendance at the discretion of the CxM.

C. The GC shall record participant comments and distribute minutes of the meeting to all parties involved.

D. The GC shall schedule and chair a commissioning kickoff meeting review the CxA's testing protocols, revisit the commissioning plan and review scheduling for upcoming testing. The kickoff meeting shall be prior to startup of major equipment and before envelope dry-in.

E. The GC shall schedule and the appropriate subcontractors shall participate in the kickoff meeting held separately from the work session.

3.3 STARTUP

A. Installing contractor(s) shall follow the start-up and initial checkout procedures listed in the Responsibilities list as required by the equipment manufacturer, in this section and in the Cx Plan. Divisions 22, 23 and 26 have start-up responsibilities and are required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents and manufacturer requirements. The Cx procedures and pre-functional and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the CxA, GC or Owner. The CxA shall be notified of startup dates and times at least 48 hours prior to the scheduled date.

3.4 CONTROLS TESTING PREPARATION AND VERIFICATION

A. The Cx responsibilities of the Controls Subcontractor in preparation for Functional Testing are:

1. Sequences of Operation Submittals: The Controls Contractor shall send to the CxA complete controls submittals. Submittals of control drawings shall include complete detailed sequences of operation for each piece of

equipment, regardless of the completeness and clarity of the sequences in the specifications. See Division 1 for complete details.

2. Points List: The Controls Contractor shall send to the CxA a draft points list as soon as it is available but no later than two months prior to occupancy. This shall be updated as often as required. A complete “as-built” points list shall be sent at the end of the project. See Division 1 for complete required contents of the points list.

3. Point-To-Point Checks and general checkout – The Controls Contractor is required to perform their own point-to-point checks and general checkout and this completed document to the CxA prior to the HVAC contractor scheduling functional testing.

4. Notification of Operation: The Controls Contractor shall notify the CxA when each piece of equipment, panel or sub-panel is under automatic control and may be viewed in operation, prior to final functional testing.

5. The Controls Contractor shall review all CxA provided functional test procedures. The receipt of the procedures by the contractor constitutes certification that the contractor has reviewed the procedures and confirmed they are safe and will not harm any equipment or systems. Any subsequent damage incurred as a result of conducting the documented verification shall be the responsibility of the contractor.

6. The Controls Contractor shall participate in simulated load testing and/or manipulation of control of equipment as needed to allow CxA to perform functional performance testing.

3.5 TAB

A. Refer to the TAB responsibilities above and in the specification section of TAB.

3.6 PRE-FUNCTIONAL TESTING

A. Prior to the beginning of the functional testing specified under this section, the HVAC subcontractor adjust and check operation and performance of the systems and equipment installed under their respective sections.

B. At the discretion of the CxA the sub systems may be required to be tested prior completion of the entire system.

C. Provide populated forms to the CxA in submittal form.

D. Without limiting other work, the following work shall be performed:

1. Verify and document that the systems and equipment are installed and functioning in accordance with the contract documents. The as-built drawings and operating manuals reflect the as built conditions.

2. The systems shall be started and their performance shall be checked and compared with the manufacturers requirements as well as design documents.

3. Blank Pre-functional checklists shall be provided by the CxA.

4. Any system or equipment which is does not pass manufacturer startup requirements and Pre-functional testing shall be repaired and replaced at no cost to the owner with the exception of any existing equipment reused or repurposed for this project. The contractor shall retest the system at their own cost until the manufacturers startup requirements and pre-functional testing criteria are met.

3.7 FUNCTIONAL TESTING

A. After review and acceptance of the manufacturer startup forms, pre-functional checklists and TAB reports, the CxA will schedule dates to begin functional testing.

B. Functional testing is intended to begin upon completion of a system installation, startup and pre-functional testing. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CxA and Owner. Beginning system testing before full completion does not relieve the Contractor from fully completing the system, including all PFTs as soon as possible.

C. Procedure Acceptance
1. On-Site Conditional Acceptance

a. Upon satisfactory completion of each commissioning procedure and completion of the procedure close-out meeting, the CxA shall provide conditional acceptance of the procedure.

b. Conditional acceptance shall indicate that the related installation work checked by the procedure and the related performance verified by the procedure is satisfactory, and that the required procedure has been completed, only.

c. Conditional acceptance shall not imply that the equipment and systems involved with the procedure are fully approved and have been provided with final acceptance. Conditional acceptance shall additionally be subject to all notes and comments included in the field notes or test forms, and subject to the satisfactory demonstration that all associated pre-testing, special testing, special testing reports, or alignment reports have been fully completed.

d. Conditional acceptance shall be indicated by the signature of the CxA on the functional testing form.

D. On-Site Procedure Rejection

1. The CxA shall have the authority to reject a procedure in its entirety or to cause the procedure to be stopped if in the opinion of the CxA, any of the following conditions exist:

    a. The pre-procedure review meeting is incomplete.

    b. Appropriate or sufficient contractor staff is not available or required commissioning representatives are not present.

    c. Required pre-testing or report data, such as point-to-point control verifications, TAB reports, and trend log data is not available or is incomplete.

    d. The installation is insufficient or incomplete as required for the procedure or not in compliance with the Contract Documents.

    e. Numerous checks or tests fail or cannot be accomplished.

    f. Installation and/or operation of equipment or systems beyond or in advance of the preliminary commissioning requirements.

    g. Installation, operation, or commissioning not in compliance with the sequencing requirements.

    h. Indication of improper maintenance or operation.

    i. Inadequate instrumentation

2. The CxA shall additionally reject a procedure and require the equipment operation or procedure to be stopped if in the opinion of the CxA unsafe conditions to either staff or equipment exist. Consideration of safety issues by the CxA shall not in any way relieve the Contractor from his sole responsibility for job site safety and protection of the equipment.

3. Direction to stop the procedure or halt the operation of equipment will be given verbally. Upon notification the Contractor shall immediately stop the procedure and restore the system or equipment to a safe condition.

4. At the discretion of the CxA, the Contractor may be afforded the opportunity to correct the conditions indicated by the CxA and resume the procedure.

5. If in the opinion of the CxA corrections cannot be implemented in a satisfactory manner, within the scheduled time available for the procedure and with sufficient time available to complete the procedure, the procedure shall be stopped and rescheduled by the CxM. The CxA shall provide the CxM with written notification of procedure rejection stating the cause of the action.

6. The Contractor shall be liable for all actual costs associated with the required attendance by the CxA, the Owner's and A/E's commissioning representatives, and required outside agents, resulting from rejected procedure.

7. Actual costs shall include:
   a. Cost for the CxA and for each Owner's and A/E's commissioning representative, which are comprised of contractual billing rate as defined in the respective organization's agreement for such work, including overhead and profit. For CxA and A/E's commissioning representatives, these rates may be found in the A/E schedule for additional services.

   b. Travel-related expenses for the CxA and for each Owner's or A/E's commissioning representative, where such staff is required to be in attendance and not headquartered within the city limits, which are comprised of compensation for actual travel time, with an established minimum of 5 hours, and mileage rates, billed at the prevailing national government rate.

   c. Costs assessed for required outside agents, contractors, or specialists employed by the Owner or A/E at the actual contractual billing rates as defined in the respective organization's agreement for such work.

   d. Equipment rentals, special tools, and related material fees associated with the participation of contracted outside organizations and specialists.

8. The costs assessed will be documented by the CxA and will be deducted from the Contractor's fees or progress payments at the time of occurrence.

3.8 FINAL ACCEPTANCE

A. Final acceptance will be contingent upon satisfactory completion of all commissioning tasks and submittals, with final review and approval by the Commissioning Authority.

B. Where specific components, equipment, or system elements are unable to comply with the specified requirements due to improper or incomplete installation, product defect, or failure of a device to perform to the manufacturer’s published or advertised capabilities, final acceptance will be contingent on repair, replacement, and correction of the deficiencies by the Contractor and satisfactory completion of the commissioning procedures.

C. Where specific components, equipment, or system elements are demonstrated to comply with the specified requirements and perform to the manufacturer’s published or advertised capabilities, but are demonstrated not to provide the performance as required by the Contract Documents and the commissioning procedures, disposition of the issue and/or related modifications shall be provided as directed by the Architect. Final acceptance shall be contingent on the completion of any resulting correction work and related commissioning requirements determined as necessary in final disposition of the issue.

D. Upon satisfactory completion of all commissioning work and resolution of all related issues, the CxA shall provide the Owner, Contractor, and the Architect with a final report documenting recommendation for final acceptance. Recommendation for final acceptance by the CxA shall indicate that in the opinion of the CxA, and as demonstrated within the extent and scope of the commissioning process,

the equipment and systems have been installed in compliance with, and function as required by the Contract Documents.

E. The Owner may accept the recommendation of the CxA and provide final acceptance by providing the appropriate authorized signature and by providing copies of the signed acceptance to all parties involved. The Owner's final acceptance of the commissioning work shall indicate that Owner accepts that the systems and equipment, as demonstrated within the extent and scope of the commissioning process, have been installed in compliance with, and function as required by, the Contract Documents. The Owner's acceptance shall not constitute agreement that all contractual obligations are fulfilled and does not constitute final acceptance of the project under the terms and conditions of the Contract Documents.

3.9 PROJECT COMMISSIONING RECORD

A. Prior to final acceptance of the commissioning process, and as a condition of final acceptance of the work, the CxA shall prepare and submit a detailed project commissioning record covering all Cx related activities.

B. The CxA shall organize and maintain the commissioning record which includes the following documents with support from the GC as needed.

1. Commissioning Plan
2. Commissioning Specification
3. Owner's Project Requirements (As Provided by the Owner)
4. Basis of Design (As Provided by the Design Team)
5. Design Review Report
6. Submittal Review Report
7. Populated Prefunctional Testing Forms (As provided by contractor)
8. Functional Testing Forms
9. Summary Commissioning Report

END OF SECTION

DPW PROJECT NO. 22091
Agricultural Diesel Mechanics Facility
College of Southern Idaho
Twin Falls, Idaho

January 2024

SEEDIdaho P.C.
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Commissioning Plan – Construction Documents

CSI: Ag Diesel Mechanics Facility

1/03/2024

Contents

Abbreviations

A/E The Architect / Engineer

AxR Other commissioning representatives of the Architect / Engineer

BOD Basis of Design

Cx Commissioning

CxA Commissioning Authority

CxM Commissioning Manager

CxR Commissioning representatives of the contractor, other than the Commissioning Manager, Commissioning representatives of the sub-contractors.

ERV Energy Recovery Ventilator

HVAC Heating Ventilation and Air Conditioning

OPR Owner's Project Requirements

OxA Owner's primary commissioning representative

OxR Other commissioning representative of the Owner

References

Technical References

ASHRAE Standard 202-2018
IECC 2018
Idaho State Commissioning Guidelines

Specifications

Section 01 91 13	General Commissioning Requirements
Section 22 08 00	Commissioning of Domestic Water Systems
Section 23 08 00	Commissioning of HVAC
Section 26 08 00	Commissioning of Lighting Systems

Introduction

Commissioning is a quality-focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.[1] Successful commissioning includes a thorough investigation of the design and equipment by qualified personnel to ensure a quality and defect free system handoff to the building owner. This includes commissioning activities which span from the pre-design phase through construction and closeout items which occur 10 months after a Certificate of Occupancy is issued. The commissioning process is documented and shall be included in the project commissioning record. The commissioning record serves as a reference document for all commissioning activities and will be provided to the owner at project closeout. The result of the commissioning process should be fully functional systems which can be properly operated and maintained by trained staff throughout the useful life of the building.

This Project Commissioning Plan describes the commissioning requirements and procedures for energy related systems at the new College of Southern Idaho, Ag diesel mechanics facility in Twin Falls, Idaho.

Based on the scope of this project, systems to be commissioned include all of the following:

- Lighting & Controls
- Heating, Ventilation and Air Conditioning & Controls
- Domestic Water Systems

For this project, the commissioning process is based specifically on Idaho State Commissioning Guidelines, ASHRAE Standard 202-2018 and IECC 2018 with reference to project specification sections 01 91 13, 22 08 00, 23 08 00 and 26 08 00 for HVAC, lighting and Domestic Water Systems commissioning. Table 1 shows commissioning related activities, responsible parties and the appropriate time of task execution.

Cx Activity	*Responsible Party(s)*	*Time Of Execution*
Incorporate Cx Specification Into Project Documents	Architect/Engineer/CxA	Design
Develop and Incorporate Cx Plan	Architect/Engineer/CxA	Design
Manufacturer Startup	Contractor/SubContractor	Construction
Prefunctional Testing	Contractor/SubContractor	Construction - Prior to Functional Testing & During Startup
Test & Balance	Testing & Balancing Contractor	Construction - Prior to Functional Testing
Functional Testing	Commissioning Authority	Construction - Prior to Substantial Completion
O&M Staff Training	Contractor/SubContractor/CxA	Prior to Occupancy

Table 1- *Commissioning Activities, Responsible Party and Execution*

[1] ASHRAE Guideline 0-2005: Section 4. Definitions

The Commissioning Process

The commissioning process is broken down into activities which should be performed at various project milestones. The commissioning process should be started and completed as the project milestones progress. For this project, project milestones include: Pre-Design, Design, Construction, and Post-Construction.

Pre-Design Commissioning Activities

The pre-design phase of the project is a preparatory phase of the project delivery process in which the Owner's Project Requirements (OPR) are developed and defined and communicated to the design team. It was the responsibility of the owner to document the OPR as part of the general commissioning process. In this case, the OPR used for this project is the RFQ document for design services.

Familiarization with the OPR is essential for all members of the design, construction and commissioning teams such that the finished product matches that of the owner's original requirements. It is with reference to the OPR that the Basis of Design (BOD) is captured in the design phase.

During the Pre-Design phase, the commissioning team is formed to organize, oversee and implement the various commissioning activities. The team organized during the pre-design phase of this project is as follows:

Agency Representative: College of Southern Idaho

Clinton Keller
Construction Project Manager
T | 208.732.6627
CKeller@csi.edu

Architect Representative: Meyers-Anderson

Richard Creason, AIA
Principal Architect
T | 208.232.3741
richard@myersanderson.com

Mechanical Engineer: MW Consulting Engineers

Luke Blanchart, PE
Mechanical Engineer
T | 509.838.9020
LukeB@MWEngineers.com

Electrical Engineer: Musgrove Engineering

Matt Bradley
Electrical Engineer
T | 208.384.0585

234 Whisperwood Wy.
Boise, Idaho, 83709
mattb@musgrovepa.com

Mechanical HVAC Contractor: TBD

TBD

Plumbing Contractor: TBD

TBD

Electrical Contractor: TBD

TBD

Commissioning Authority: SEED Idaho P.C

Michael Jones P.E. CPMP, CEM, LEED AP
913 S. Latah St. Suite H.
Boise, ID, 83705
(c) (208) 297-9960
mikejones@seedidaho.com

Commissioning Representatives

The following people are considered main POC's for their representative entity regarding the commissioning process:
Commissioning Authority (CxA) – Michael S. Jones (208) 297-9960
Owner's Representative (OxR) TBD –
A/E Team Representative (AxR)- Richard Creason – (208) 232-3741
CxM (of Commissioning Agent) – SEEDIdaho P.C - TBD
CxM (of Contractor) – TBD

Design Commissioning Activities

During this phase, the OPR evolves into the Basis of Design (BOD). In the case of this project, the schematic design narrative documents, are considered the Basis of Design. It is towards the end of design that the Commissioning Authority created the commissioning specification and plan to ensure that all parties know their role in the commissioning process prior to bidding. This allows the Commissioning Authority to define the requirements of the commissioning team and contractor during the construction commissioning activities.

As construction begins, the CxA may provide an updated Cx Plan and work with the owner and design team to update the OPR and BOD to reflect any changes presented during the advancement of the design or items that may have surfaced during bidding. Though the CxA reserves the right to adjust this

plan during the construction phase, such an action would most likely not occur to avoid any potential for change orders. In parallel with the update of the Cx Plan during the design process, the pre-functional and functional performance testing forms will be created. These forms will not be finalized until the beginning of construction and after the submittal review is complete indicating that specific systems and equipment selections have been confirmed.

Construction Commissioning Activities

As construction progresses the CxA, as retained by the owner, will provide and updated Cx Plan. The commissioning plan is considered a living document which can change to accommodate any unforeseen variances resulting from RFI, ASI CCD or other general changes in the construction process. This plan will first be included in the project specification manual such that the contractor shall be fully informed as to the commissioning process and future commissioning related responsibilities prior to bidding.

As construction progresses, the Commissioning Authority will chair the pre-commissioning work session with the CM and/or GC and HVAC and Plumbing subcontractors. The goal of the work session is to foster communication amongst all parties, review the commissioning plan and the commissioning process in general. After the pre-commissioning work session, the commissioning authority will develop pre-functional testing protocol in the form of short checklists. These checklists will be distributed to the contractor and appropriate subcontractors along with instructions for commissioning submittals around HVAC Rough-In at the Commissioning Kickoff Meeting. The Commissioning Authority will coordinate with the construction manager to schedule the kickoff meeting at the appropriate time. **For bidding purposes, the general, hvac, controls and electrical subcontractors should include time for Qty(2) – 2 hour meetings.** All other commissioning related meetings shall be held during regularly scheduled OAC meetings.

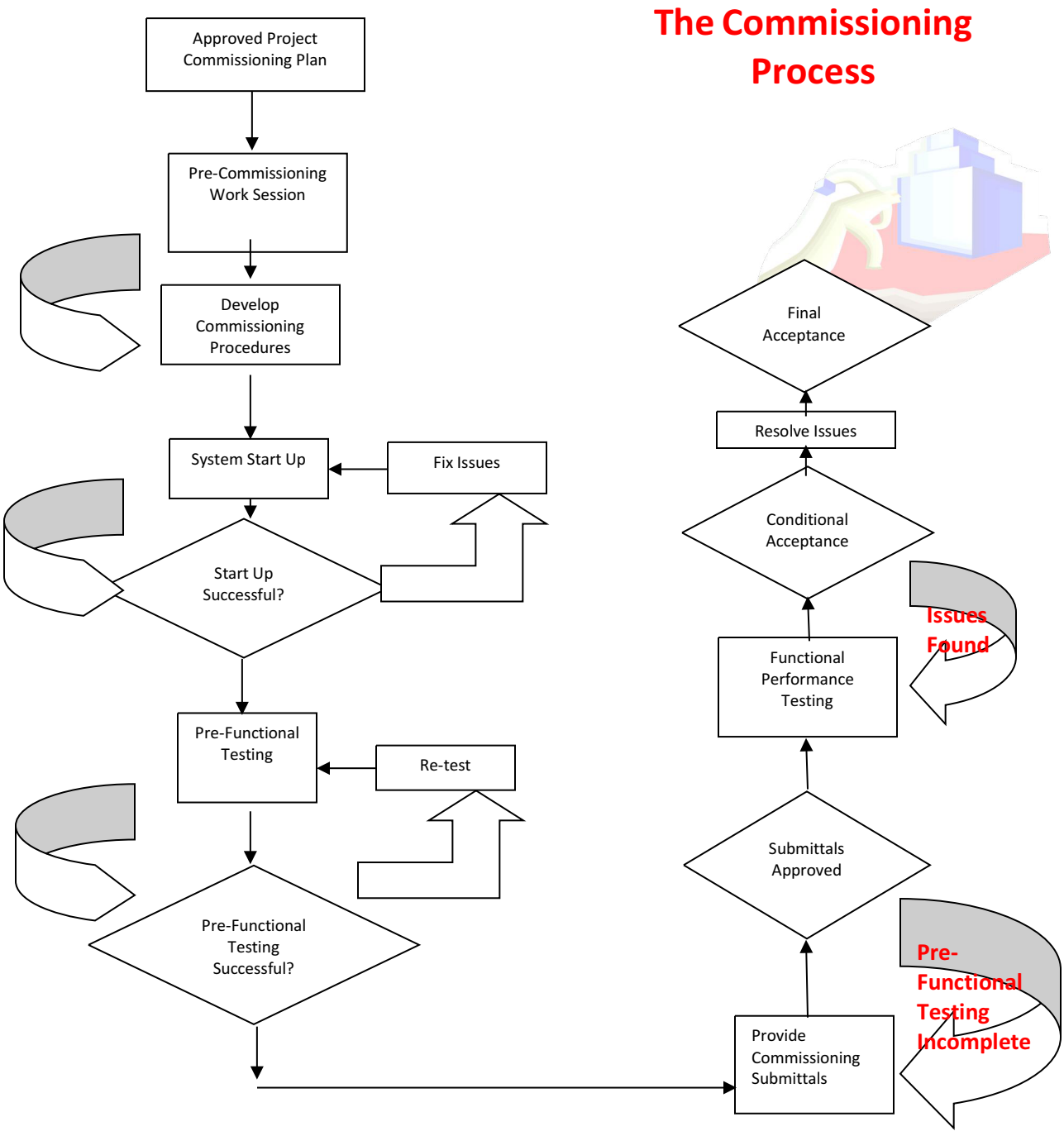
The commissioning related submittal documentation is to be populated only after manufacturer and/or contractor startup procedures are completed. The purpose of these checklists is to ensure that all systems are ready for functional testing by the Commissioning team. All submittals, including manufacturer and contractor startup forms, and pre-functional testing forms shall be provided to the CxA for review by the appropriate commissioning team member prior to scheduling any functional testing. **For bidding purposes, the HVAC/Controls contractor should include time to perform cursory pre-functional tests and populate forms for every air handler, pump, existing chiller, boiler. An example of a typical pre-functional testing protocol can be found in Appendix A.**

As pre-functional testing by the subcontractor nears completion, commissioning meetings will become more frequent, shall align with functional performance testing efforts and regularly scheduled site construction coordination meetings. Completed pre-functional testing forms shall be fully populated and provided for review by the CxA to verify that the system is ready for functional testing. On this submittal, the contractor shall request a date for functional performance testing to begin or coordinate a date with the appropriate commissioning team member.

Once the date for functional testing has been established the appropriate commissioning team member, general and subcontractors will meet onsite prior to testing. The commissioning team member and interested parties will discuss the schedule for functional testing of the system in question and run

through the process for specific equipment. No functional performance testing shall be conducted until the contractor or subcontractor has demonstrated successful completion of all manufacturer startup and pre-functional testing forms supplied by the CxA. The populated forms must be approved by the CxA before moving forward with functional performance testing. Figure 2 below shows the flow of relevant construction related commissioning activities. **For bidding purposes, the mechanical and controls contractor shall each allot trained personnel, familiar with the installation for 2 hours (each) for every day of functional testing shown in the "Systems to Be Commissioned Section". Note this is a cumulative estimate, meaning some days may by 0 hours while others may require 8. The CxA will make best efforts to schedule testing on days when contractors are already onsite performing other work.**

Figure 2


The Commissioning Process
Approved Project Commissioning Plan
Pre-Commissioning Work Session
Develop Commissioning Procedures
System Start Up
Fix Issues
Start Up Successful?
Pre-Functional Testing
Re-test
Pre-Functional Testing Successful?
Provide Commissioning Submittals
Pre-Functional Testing Incomplete
Submittals Approved
Functional Performance Testing
Issues Found
Conditional Acceptance
Resolve Issues
Final Acceptance

Pre-Functional Testing

This first construction-based commissioning activity is intended to demonstrate that the equipment component, system, or sub-system is sufficiently complete to allow start-up and operation in at least a limited fashion and by the contractor. Pre-functional testing should only commence once all system specific static tests (as required by contract documents), manufacturer recommended pre-start up and start up checks have been completed. Manufacturer forms should be retained and provided to the CxA along with other commissioning submittals. Furthermore, systems shall not be operated continuously until the Pre-Functional testing checks are completed and approved by the CxA. Only the appropriate contractor who installed the equipment or system needs to be present for Pre-functional checks. The contractor is expected to document the pre-startup check and populate the pre-functional testing forms supplied by the CxA. The CxA will distribute pre-functional testing worksheets for all systems to be commissioned to the appropriate CxR at the commissioning kickoff meeting. Completion of these worksheets provides documented proof that the equipment or system has passed the necessary checks and is ready for functional performance testing by the commissioning team. They also provide initial operation conditions allowing detailed adjusting and balancing and control device tuning or adjustment to proceed. The procedures will demonstrate initial and interim operation in compliance with the manufacturer's requirements and will provide certain baseline data for future operations and maintenance. In general, the installing contractors, the controls contractor, and the testing and balancing agency are present for these pre-functional and start-up procedures. All are expected to document the procedures and provide reports which document proper operation. Documents such as the Testing and Balancing reports should be provided to the CxA for review when available and are to be included in the final commissioning report.

Functional Performance Testing

Once the CxA has reviewed and accepted all commissioning submittals, functional performance testing shall be scheduled by the contractor's CxM or CxR. Scheduling should be organized as not to disrupt the construction process. Functional performance test are intended to verify acceptable system operation in various modes of control or application, stability of control during control mode transitions as well as general operational conformance with the contract documents. These tests typically extend past the review or equipment functionality to equipment control review. Depending on the control method (local or through a Building Management System (BMS), the overall control strategy is reviewed to make sure that the equipment is being controlled correctly and efficiently. In general, the owner's representative (optional), the general contractor and the commissioning authority are present for functional testing. If systems do not appear to be operating as expected then the design engineer, the installing contractor, the controls contractor, and/or the equipment manufacturer may be asked to join at no additional fee. All functional testing protocol will be developed by the commissioning team and made available to any interesting parties. The Commissioning Authority and subcontractors will conduct all functional testing with support by the installing contractor as needed. During this process, the Commissioning Authority will maintain the Commissioning "Issues Log" to track all items that are discovered during the testing period. These issues will first be brought to the attention of the installing contractor. If these items can't be immediately addressed, they will be brought to the attention of the general contractor. Only if

the issue cannot be adequately addressed by the construction team, the item will be brought to the architectural/engineering team and owner's attention.

Upon review of the final issues log, only the owner can defer issues discovered by the commissioning team, at their discretion. If issues that would severely impede occupancy or occupant safety are still outstanding, these issues must be resolved prior to Conditional Acceptance. Should only minor or issues that will not affect regularly occupancy still be outstanding, the Commissioning Authority at their discretion will recommend Conditional Acceptance. Conditional acceptance is an intermediary milestone which allows the contractor to review outstanding issues. It is highly recommended that the A/E team and owner review the Conditional Acceptance memo during this time prior to determining substantial completion. Final acceptance is contingent upon successful resolution of outstanding issues or owner deferral.

Post-Construction Commissioning Activities

By this time, final acceptance should have been provided by the commissioning team and all equipment should perform within the capabilities of the documented design and specified equipment capacities, according to the owner and A/E team functional criteria and all issues discovered during the commissioning process should be resolved. There are three main commissioning activities which happen after construction is complete, two of which are initiated once all construction based commissioning activities have been completed. First, the contractor supplied Operation and Manual (O&Ms) shall be provided.

Second, the CxA shall witness all O&M staff training which covers all systems previously commissioned. The training session shall be planned by the installing contractor and executed in compliance with specification requirements. At minimum, the contractor will review record documents with the staff and cover recommended operation instructions for normal operation and emergency situations. In addition, adjustment instructions, troubleshooting, maintenance, inspection and repair procedures shall also be covered.

Lastly, a warranty review will be conducted by the CxA and contractor 2 months prior to the end of the warranty period. This will involve a one-day site visit to interview site O&M staff and occupants to log any complaints regarding commissioned systems. If necessary, specific systems will be re-investigated to ensure systems continue to operate as intended. A warranty punch list will be created to cover any deficiencies such that they may be repaired prior to the warranty expiring.

Commissioning procedures and tests to be applied to systems included in the commissioning process are described herein. Roles and responsibilities of the Contractors, Owners, Architects, Engineers, and other related members are defined, and the requirements for the management and administration of the commissioning effort are described. The equipment listed in this commissioning plan shall pass all pre-functional and functional testing before final acceptance can be issued. Each sub-contractor of the general contractor will be expected to dedicate individuals and time to the commissioning process in order to fulfill all obligations listed in this plan. The general contractor is expected to schedule and coordinate all meetings in conjunction with the commissioning team. Per the commissioning specification, the general contractor, sub-contractors and commissioning team are expected to work

together and provide the necessary equipment and manpower to ensure a fully functioning and tested system. The mechanical, electrical, controls, and plumbing sub-contractors should pay special attention to this document in order to fully understand responsibilities assigned and meetings to attend, as the general contractor will expect you to fulfill obligations listed herein.

Systems to be Commissioned

The following systems will be commissioned. Commissioning includes all contractor required activities & testing outlined in this report. Functional testing is to be performed by SEEDIdaho and sub consultants, with some support by installing contractors. It is estimated that functional testing of equipment for this project will take 12+ full days. This functional performance testing is reliant on completion of pre-functional submittal and approval. Note that 12 full days is a "best-case" scenario. The actual timeframe for functional performance testing is strictly dependent on the quality of work performed and problems discovered by the commissioning team during testing. Follow up visits may be required to verify that all issues log items have been addressed. Refer to the "Commissioning Procedures" section for system descriptions and detailed commissioning procedures for each system.

Day 1-3 - Boilers, Heating Hydronic Loop and Gas Unit Heaters

Including fuel piping connections to boiler and unit heaters, hydronic loops and associated connections, flow control devices, pipe fittings, pumps. This includes the gas unit heaters and the boilers themselves. Boiler operation will be reviewed and tested based on an established testing protocol. Heat transfer properties will be evaluated under various loadings using the air handlers and terminal units. Automatic and manual control functionality will be tested. Ability to automatically operate and maintain required loop temperature under various loading conditions as a complete system will be evaluated. All systems and equipment will be inspected for installation quality, conformance with contract documents and lastly a flue gas analysis will be performed to understand combustion efficiency on the boilers. Gas unit heaters will be tested for heating ability and local controllability. All systems and equipment will be inspected for installation quality and conformance with contract documents.

For the Heating Hydronic Loop, connections to air handlers, motorized valves, system pumps and VFDs, flow control devices, pipe fittings pumps, air handler coils, bypass systems and piping specialties will be investigated. Automatic and manual control functionality of the hydronic loop and peripherals in general will be tested. All hydronic systems and equipment will be inspected for installation quality, conformance with contract documents and lastly power usage.

Day 4 and 5 – Air Handler and Makeup Air Units

Including DX and Hot water coil connections to the hot water loop, duct connections, internal fan and damper operation, motorized actuators and VFDs will be reviewed and tested based on an established testing protocol. Air Handlers will be subjected to load testing which may be altered depending on outdoor conditions at the time of commissioning. Automatic and manual control functionality will be tested. Ability to automatically operate and maintain required discharge air temperatures under various

loading conditions as a complete system will be evaluated. All systems and equipment will be inspected for installation quality, conformance with contract documents and lastly power usage.

Day 6 –Split System Units

Including indoor and outdoor coil mounting, refrigerant piping practices, insulation, compressors, fans and other outdoor equipment. Refrigerant charge will be reviewed and ability to cool in various conditions will be reviewed and tested based on an established testing protocol. Automatic and manual control functionality will be tested. Ability to automatically operate and maintain required discharge air temperature under various loading conditions and as a complete system as integrated with the DDC will be evaluated. All systems and equipment will be inspected for installation quality and conformance with contract documents.

Day 7 and 8 and 9–Terminal Units, Exhaust Fans, Electric Heaters

Including connections to hydronic loops, flow control devices, pipe fittings, dedicated pumping pumps, terminal unit coils and piping specialties. Heat transfer properties will be evaluated under various loadings using the air handlers. Automatic and manual control functionality will be tested. Ability to automatically operate and maintain discharge air temperatures and flows under various loading conditions individually and as a complete system will be evaluated. Electric unitary heaters will be tested for heating ability, power usage and local controllability. All systems and equipment will be inspected for installation quality and conformance with contract documents.

Day 9 &10– Direct Digital Controls (DDC)

Including all HVAC controls and sequences. After point to point verification and checkout (by installing controls contractor) documentation is reviewed, the commissioning team will use the DDC system to manipulate set points or operating parameters of connected equipment and evaluate for proper response. Control sequence and operative control over time will also be tested.

Day 11- Plumbing System and Domestic Hot Water

Including general fixture installation, domestic water heating systems, piping insulation, and domestic water pumps. All systems and equipment will also be inspected for proper control, installation quality and power usage as well as discharge and recovery times.

Day 12 Interior/Exterior Lighting & Controls

Including all interior fixtures and rooms with daylight control and / or occupancy control. Exterior lighting will also be tested for control and power usage. All fixture operating wattages will be documented along with day and night time room illuminance values. All systems and equipment will be inspected for installation quality, conformance with contract documents and lastly power usage.

Team Organization

The general or prime contractor shall manage the schedule for the commissioning procedures throughout the construction process. The general or prime contractor will designate a specific individual as the Commissioning Manager (CxM) to manage the commissioning effort on behalf of the construction team. The Commissioning Manager will be the single point of contact and communications for all commissioning related events. University of Idaho shall also designate a commissioning representative to follow the commissioning activities on behalf of the owner.

SEEDIdaho shall participate in manage and oversee commissioning related activities for the purpose of operational verification and contract document interpretation. SEEDIdaho will designate a specific individual to act as their Commissioning Manager (CxM) and a separate individual to serve as the Commissioning Authority (CxA). This individual shall be the single point of contact and communications for all commissioning related activities on behalf of SEEDIdaho and will coordinate the participation of all SEEDIdaho representatives and commissioning related activities.

It is recommended, though not required, that the owner and A/E team participate in commissioning related activities for the purpose of verification and training. This individual shall act as the Owner's (OxR) and separately A/E team's (AxR) respective Commissioning Representative. The owner may additionally appoint various individuals as Owner's Representatives to participate in the commissioning procedures if appropriate. The Owner's Commissioning Representative in collaboration with the designated Commissioning Manager may also act as a point of contact and communications for all commissioning related activities on behalf of University of Idaho and may coordinate the participation of all owner's representatives and commissioning related activities.

The Commissioning Authority will additionally serve as the owner's agent in review and approval of commissioning related items.

Team Member Responsibility

The general or prime contractor and installing subcontractors shall become knowledgeable in the requirements of the project commissioning documents, including the commissioning plan specifications and the project drawings, and will coordinate the work of all trades providing commissioning services.

The general or prime contractor shall coordinate the work required by individual specification sections for static, manufacturer startup and pre-functional testing with the commissioning services requirements and ensure all requirements are met.

SEEDIdaho will manage the commissioning process, while the general or prime contractor manages scheduling of all procedures with subcontractors. General or prime contractor will also require the subcontractors to provide the necessary staff, tools, instrumentation, and coordination of the work in order to support the commissioning effort. General or prime contractor will designate a specific individual as the Commissioning Manager who will schedule the commissioning effort in coordination with the commissioning authority SEEDIdaho.

General or prime contractor will schedule and coordinate the provision of all owner training and educational services with the owner's staff. Each sub-contractor will be responsible for providing a few hours of training to the owner or owner's staff or representative, for each piece of equipment installed per project specification requirements.

General or prime contractor and subcontractors shall perform the commissioning requirements outlined in this plan and specifications utilizing members of the construction staff and representatives of the equipment and system manufacturers who are fully knowledgeable of the

Commissioning Manager (CxM)

- Manage the commissioning activities and serve as a single point of contact and communication on behalf of their representative entity.
- Coordinate the team member assignments and scheduling for all commissioning related activities.
- Review the detailed commissioning plan. Thoroughly review all commissioning requirements and procedures and become knowledgeable in all aspects of the commissioning requirements. Develop modifications and additions to the specified commissioning procedures for inclusion in the final procedure submittals as follows. [2]
    - As required to adequately reflect the requirements for job-site safety and adequate protection of the systems and equipment.
    - As required to gain acceptance by the respective equipment manufacturers that the procedures can be provided in a manner which fully protects the equipment and which maintains full equipment warrantees and guarantees.
    - As required to coordinate all scheduling and sequencing requirements.
    - As required to adequately reflect the actual conditions, equipment, and systems, as installed.
- General or prime contractor CxM – Distribute and oversee prefunctional testing for subcontractors as required by the CxA. Provide populated prefunctional checklists to the CxA in submittal form for review by the CxA.
- General or prime contractor CxM - Schedule and coordinate all Owner training activities and coordinate training requirements with all commissioning and contract document requirements.
- SEEDIdaho CxM – Provide a coordination schedule of all commissioning activities to General or prime contractor 's CxM. Coordinate notification of all functional testing procedures to the appropriate commissioning team representative

[2] Contractor modifications and additions to the commissioning procedures documented herein will be fully annotated to indicate the specific changes and the reasons for each change and recognizing that additions and modifications to the commissioning procedures are subject to review and approval by the Commissioning Authority.

- SEEDIdaho and General or prime contractor CxM - Coordinate and provide all tools, instrumentation, and special testing apparatus and staff as necessary to perform the required commissioning procedures.
- SEEDIdaho CxM - Manage and direct the performance of all commissioning procedures, testing, or inspections, and provide detailed record keeping of all commissioning documentation requirements.[3]
- SEEDIdaho CxM - Maintain a master file of all completed procedure originals and all original field annotated procedure forms. The Commissioning Manager shall transfer all field procedure results, comments, and annotations to the computerized file copy of the procedure and shall distribute one hard copy of the completed procedure form to each participant.

The Commissioning Authority (CxA)

- Conduct the commissioning activities in coordination with SEEDIdaho's CxM and subcontractors on behalf of SEEDIdaho and serve as a technical representative of the owner for all commissioning related activities.
- Coordinate the commissioning representative staff assignments and scheduling for all commissioning related activities as applicable. Manage and coordinate the involvement of all Architect/Engineer Representatives, Owner Representatives and other non-construction team commissioning representatives.
- Provide consultation with owner for involvement in the commissioning procedures, training, and related activities.
- Serve as the agent for owner in review and approval of commissioning related submittals, and commissioning procedures.
- Provide interpretation of the commissioning specification and related construction contract documents on behalf of the Architect, Owner or Engineer.
- Development of system specific pre-functional and functional testing protocol.
- Perform Functional Testing of all systems covered in this plan with support from the general and sub-contractors.
- The Commissioning Authority is approved by the owner and A/E team to reject testing procedures in part, or in their entirety, on-site, at the time of procedure application or performance, if in the opinion of the Commissioning Authority any of the following conditions exist:
    - Incomplete or falsified commissioning submittal documents.

[3] The Commissioning Manager or designated assistant shall provide all field record keeping of all procedure results. All field data, notes, and comments, shall be neatly hand labeled in the respective procedure forms during each procedure.

- Appropriate or sufficient system installer staff is not available or required commissioning representatives are not present.
- Required start-up or pre-functional testing is incomplete
- The installation is insufficient or incomplete as required for the procedure or not in compliance with the contract documents.
- Numerous checks or tests fail or cannot be accomplished.
- Indication of improper startup or operation.
- Testing and Balancing incomplete.

- Review preliminary and final TAB reports.
- Document issues relating to commissioning, construction, system or equipment performance testing, determined by the Commissioning Authority to require resolution, Change Orders, Construction Change Directives, or other modifications or corrections, and make recommendations to the design team's construction administration staff or owner for resolution.
- Document findings in the summary commissioning record, make owner aware of pending any resolved issues and make recommendations for final acceptance to the University of Idaho.

Owner's Commissioning Representative (OxR)

- Manage the commissioning activities on behalf of University of Idaho and serve as a single point of contact and communication for the owner for all commissioning related activities.
- Attend and witness commissioning procedures at their discretion. The Owner's commissioning representatives may attend and witness procedures as deemed appropriate by University of Idaho. In all cases, the Owner's Commissioning Representative will be provided notice of the scheduled commissioning activities and provided opportunity to be in attendance and to schedule other Owner's representative to be in attendance as desired. The Owner's Commissioning Representative will be responsible for determining the participation of Owner's representatives and all corresponding Owner's staff assignments and scheduling.
- Attend and participate in Owner training sessions. Coordinate the attendance of all Owners' representatives in the training sessions and be responsible for determining the participation of Owner's representatives and all corresponding Owner's staff assignments and scheduling.[4]

[4] The Owner's representatives are not intended to participate in commissioning procedures for the purpose of operating equipment or systems, or to provide adjustment, testing, or other activities specified as work to be performed under the construction contract.

Process Administration

General

SEEDIdaho is responsible for the coordination of all commissioning requirements with General or prime contractor as well as overseeing and executing the commissioning process in general. As the third party technical representative, the owner requires SEEDIdaho to review system(s) operation, identify any issues or non-conformance with construction documents and make recommendations for resolution.

General or prime contractor is responsible for the implementation and construction management aspects of the commissioning process as well as the specific scheduling of all procedures to provide the sequenced application of the commissioning requirements within the context of the general construction schedule.

Project Commissioning Plan

This Project Commissioning Plan details the overall approach to commissioning, team organization roles and responsibilities, sequence and scheduling of activities, with reference to checks, test, and procedures to be employed, coordination and integration of Owner training, methods of team communication and record keeping, and coordination with construction activities required in other sections of the project specifications.

SEEDIdaho has developed and formatted the Project Commissioning Plan using the suggested sections and format of the Commissioning guidelines provided by ASHRAE.

The completed and approved Project Commissioning Plan, and all subsequent revisions to the plan provided during the construction process will be provided by the Commissioning Authority in hard copy and in electronic form.

Pre-Commissioning Work Session

General or prime contractor ’s Commissioning Manager will schedule and chair a pre-commissioning work session to provide general coordination for commissioning. The main purpose of this work session is to explain the commissioning process and to begin planning & integration of requirements into the construction process in general. The Commissioning Agent will provide an overview of the Commissioning Process and details of the commissioning plan during this work session. Shortly after this coordination work session, General or prime contractor will report on their plan for management and administration of the commissioning process on their end, construction integration and coordination, commissioning procedures and sequencing in collaboration with the Commissioning Authority and team.

The work session will be held at the project site. The Commissioning Manager, the Commissioning Authority, Commissioning Subcontractors, Owner’s Commissioning Representative, and the A/E’s principle construction administration representatives should be scheduled for attendance. Attendance

by conference call is permitted. It is suggested that this meeting take place during a regularly scheduled on-site construction coordination meeting.

Within 2 weeks of the work-session, SEEDIdaho P.C and sub consultants will organize all static, pre-functional, and functional testing requirements, for contractor reference and scheduling.

Commissioning Kickoff Meeting

General or prime contractor 's Commissioning Manager will schedule and chair a Commissioning kickoff meeting towards the end of HVAC rough-in but before major equipment is placed. General or prime contractor will present the status of construction for all systems to be tested and provide general coordination for commissioning. General or prime contractor will also coordinate their plan for management and administration of the commissioning process on their end, construction integration and coordination, commissioning procedures and sequencing. The Commissioning Agent will provide General or prime contractor and subcontractors with pre-functional testing forms and field any related questions with reference to this commissioning plan.

Meeting date notification will be provided to the required participants a reasonable number of weeks prior to the meeting. The meeting notification will include a proposed agenda. It is suggested that this meeting take place during a regularly scheduled on-site construction coordination meeting.

Static/Dynamic Testing, Manufacturer Testing and Pre-Functional Testing

Populated system specific static/dynamic, manufacturer and pre-functional testing documentation should be provided to General or prime contractor 's Commissioning Manager by the installing subcontractor and checked for completeness. All populated forms shall be uploaded to Project Mates and/or provided to SEEDIdaho to review. Pre-functional testing protocol and blank forms shall be provided to the contractor by SEEDIdaho for population by the appropriate subcontractor at the commissioning kickoff meeting. Static/Dynamic testing/forms must be developed or extracted from the project specifications by the installing contractor, populated and provided in parallel with the pre-functional testing form submittal. Manufacturer startup testing/forms must be retained by the installing contractor by the equipment supplier, populated and provided in parallel with the pre-functional testing form submittal.

Functional Testing

System specific functional testing protocol shall be developed and executed by SEEDIdaho and commissioning subcontractors with support from installing contractors as required. Testing protocol shall be aimed specifically at testing from the individual component level, to the system level, and ultimately to the multiple integrated level of system operation. The goal to identify and resolve any operational problems and ensure that systems are integrated as well as operating correctly and efficiently.

Conditional Acceptance

At their discretion, and dependent on functional testing results, SEEDIdaho shall provide a conditional acceptance memo to the General or prime contractor and the Owner Representative. The memo shall only be provided if any and all issues that may affect normal occupancy or operation are addressed. Minor issues not affecting normal occupancy or systems use may be outstanding at this time, and shall be included in this memo. It is recommended that the Owner and A/E representative review this memo and any outstanding issues before making decisions regarding substantial completion.

Final Acceptance

Upon satisfactory completion of all commissioning work and resolution of all related issues, the Commissioning Authority will provide the owner with a final report documenting recommendation for final acceptance. Recommendation for final acceptance by the Commissioning Authority is intended to indicate that in the opinion of the Commissioning Authority, and as demonstrated within the extent and scope of the commissioning process, the equipment and systems have been installed in compliance with, and function as required by the contract documents.

At their discretion, University of Idaho shall accept the recommendation of the Commissioning Authority and conclude final acceptance. University of Idaho's final acceptance of the commissioning work shall indicate that they accept that the systems and equipment, as demonstrated within the extent and scope of the commissioning process, have been installed in compliance with, and function as required by, the contract documents.

Project Commissioning Record

SEEDIdaho with support from General or prime contractor will prepare and submit a Project Commissioning Record which will consist of all documented commissioning activities and documents including the summary commissioning report and field-testing results.

The project commissioning record will include the design and submittal review repors, the summary commissioning report and populated manufacturer startup, pre-functional and functional testing worksheets and other relevant information.

Project Specific Commissioning Procedures

The sequenced application of the procedures is intended to provide a step-wise development, proceeding from the individual component level, to the system level, and ultimately to the multiple integrated level of system operation. This sequenced approach is intended to help ensure that the installation is free of defects at the earliest opportunity, allowing increased time for correction or modification if defects or performance issues are found.

Procedure forms to be used for "pre-functional" testing will be provided by the SEEDIdaho and shall be completed in parallel with manufacturer startup, specification required static and dynamic testing by the installing contractor. Once complete, all forms should be provided by the subcontractor for initial

review by General or prime contractor for completeness, then uploaded to Project Mates or provided directly to the CxA. All forms must be reviewed and approved by the Commissioning Authority or commissioning subcontractor prior to scheduling functional testing.

General or prime contractor and subcontractors shall perform their required procedures utilizing members of the construction staff and representatives of the equipment and system manufacturers who are fully knowledgeable of the equipment and systems installation and operation. Commissioning procedure forms shall include a specific listing of individuals responsible for the work and their respective organizations or roles. Personnel signatures provided by participants shall not constitute acceptance of the procedure, equipment, or system but verification that their entity has completed the required static/dynamic tests, manufacturer startup and pre-functional testing procedures.

Functional Testing Procedures

SEEDIdaho will develop and execute all functional testing procedures for each unique system while coordinating with the appropriate installing subcontractor. Testing protocols shall be made available to all interested parties prior to start of the testing. The below narratives provide a high-level view of testing protocols to be developed and executed by SEEDIdaho and sub consultants.

Functional testing procedures for HVAC systems are aimed at verification of the quality of workmanship and that the HVAC system was installed and proven to operate in compliance with the contract documents. Furthermore, the testing protocol will focus on establishing an as-built record of the HVAC system performance. Functional performance testing will demonstrate the performance of the HVAC system by systematically tests from the component level (sensor, actuators etc.), to the equipment level (fans, Packaged RTU's etc.), to the system level (governing controls, operation over time, etc.) At the end of functional performance testing, SEEDIdaho will update the master issues log, document any issues and final resolution paths and any outstanding issues. Conflicts identified during the acceptance phase, prior to substantial completion, shall be addressed and resolved to the owner's satisfaction. Operations and maintenance personnel should be made available to observe all verification and functional performance tests at the discretion of the University of Idaho project manager. At the end of the acceptance procedures, the HVAC system will have been proved and documented to be operational and performing in accordance with the contract documents. This would include all normal operational modes, as well as abnormal or emergency conditions.

Functional testing procedures for the domestic water system aims at verifying that the domestic hot water system has been installed and proven to operate in compliance with the contract documents.

Though testing protocol varies per system, procedure completion and system "acceptance/rejection" procedures are the same:

On-Site Conditional Acceptance

Upon satisfactory completion of each functional testing procedure, the Commissioning Authority shall provide conditional acceptance of the procedure.[5]

Conditional acceptance of systems will be verbally communicated by the Commissioning Authority to the appropriate commissioning representative. In a timely manner, the CxA will provide information on acceptance and any conditions prohibiting final acceptance to the Commissioning team.

On-Site Procedure Rejection

The Commissioning Authority will have the authority to reject a procedure in its entirety or to recommend the procedure be stopped if in his/her opinion, any of the following conditions exist:

- The pre-procedure review meeting is incomplete.
- Appropriate or sufficient contractor staff is not available or required commissioning representatives are not present.
- Incomplete manufacturer startup forms.
- Incomplete pre-functional testing forms.
- The installation is insufficient or incomplete as required for the procedure or not in compliance with the contract documents.
- Numerous checks or tests fail or cannot be accomplished.
- Installation and/or operation of equipment or systems beyond or in advance of the commissioning requirements. Installation, operation, or commissioning not in compliance with the sequencing requirements.
- Indication of improper startup operation.

The Commissioning Manager or his designee will determine the instrument requirements for testing and performance verification.

Recommendations to stop the procedure or halt the operation of equipment will be given verbally. Upon notification, General or prime contractor or subcontractors, at their discretion, will stop the procedure and restore the system or equipment to a safe condition.

At the discretion of the Commissioning Authority, General or prime contractor or subcontractors may be afforded the opportunity to correct the conditions indicated by the Commissioning Authority and resume the procedure.

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[5] Conditional acceptance shall indicate that the related installation work checked by the procedure and the related performance verified by the procedure is satisfactory, and that the required procedure has been completed, only.

Conditional acceptance shall not imply that the equipment and systems involved with the procedure are fully approved and have been provided with final acceptance. Conditional acceptance shall additionally be subject to all notes and comments included in the field notes or test forms, and subject to the satisfactory demonstration that associated pre-testing, special testing, special testing reports, or alignment reports have been satisfactorily completed.

If, in the opinion of the Commissioning Authority, corrections cannot be implemented in a satisfactory manner, within the scheduled time available for the procedure and with sufficient time available to complete the procedure, the procedure may be stopped and rescheduled by the Commissioning Manager. The Commissioning Authority shall provide the Commissioning Manager with written notification of procedure rejection stating in detail the cause of the action.

As functional testing procedures are completed, SEEDIdaho P.C and sub-consultants will update the master issues log and, if no issues that could potential affect the safety and wellbeing are outstanding, the Commissioning Authority will issue a notice of conditional acceptance. The owner or A/E team may use this information to issue final acceptance. Final acceptance must be addressed prior to the Final Commissioning Report being issued unless otherwise directed by the owner.

Owner Training

Training will be provided to the University of Idaho's designated O&M staff or contracted maintenance entity by General or prime contractor and subcontractors. The Training Plan, developed by General or prime contractor will fully describe the training approach at which they Construction plans to initiate. The following elements of the training are anticipated:

- Post-Construction training will be provided by General or prime contractor and the subcontractors on all of the equipment and systems commissioned. Equipment adjustment and operation training will be provided as part of this commissioning process.
- General or prime contractor and subcontractors will cover all aspects of the operation (both standard and emergency), suggested maintenance, and troubleshooting procedures for all commissioned systems and fire/life safety.

Prior to beginning any training program, a detailed agenda for the training program and a description of the program contents will be submitted by General or prime contractor to the Commissioning Authority and Owner Representatives.

For training, each subcontractor should review owner training requirements declared in contract documents for each system.

Advance notification shall be provided to the Owner's Commissioning Representative, the Commissioning Authority, and all required participants of each training or instruction session reasonably in advance of the scheduled date of each session. The notification shall include an agenda describing the items to be included in the session.

Training Session Audio and Video Recordings

General or prime contractor shall coordinate the Video and Audio recording of the training for future use by O&M staff if requested to do so by the owner or required by contract documents. The recordings will be professional quality and provided in DVD format. Two copies of each DVD should be retained by University of Idaho facility for future O&M staff training. One copy of each DVD shall be delivered to the Commissioning Authority if requested.

The Owner and the Commissioning Authority will be granted all rights to reproduce the recordings, in any fashion, and by a means, for University of Idaho or SEED Idaho's continued internal training programs and other internal purposes.

The Commissioning Record

General Description

The Project Commissioning Record documents the overall approach to commissioning, team organization, sequence and scheduling of activities, and includes:

- Populated Pre-Functional Checklists (General or prime contractor and Subcontractors)
- Populated Functional Checklists (SEEDIdaho)
- Issues log and Resolution (SEEDIdaho /General or prime contractor /Subcontractors)
- Summary Commissioning Report (SEEDIdaho)

Outline of Included Documents

Testing (by others) to be reviewed by SEEDIdaho

(Responsible Party must submit documentation showing test results and pass/fail)

- Test & Balance Report - By Test & Balance Contractor
- Control System Point-to-Point Verification and General Checkout – By Controls Contractor

Static/Dynamic Tests, Manufacturer Startup, Populated and Approved Pre-Functional Performance Testing Sheets (General or prime contractor and Subcontractors))

- HVAC (Hydronic and Airside)
- Domestic Water Systems
- Building Automation Equipment and DDC

Populated and Approved Functional Performance Testing Sheets (SEEDIdaho)

- HVAC (Hydronic & Airside)
- Domestic Water Systems
- Direct Digital Controls

Systems Manual

General or prime contractor and subcontractors will provide one copy of the O&M manuals, statements of warranties and recommended maintenance schedules to the Commissioning Authority at project closeout and under the direction of the CxA to ensure compliance with LEED requirements. SEEDIdaho

will provide a systems narrative to describe systems configuration. This document will be provided in the final commissioning record and provided to the owner at closeout.

REQUEST FOR INTERPRETATION

R.F.I. No: _____ To: _____

Date: _____ Project Name: _____

Regarding: _____ Contract For: _____

From: _____ Project No: _____

Specification Section **Paragraph** **Drawing No** **Detail**

Request:

Signed by: _____ **Date:** _____

Response:

Signed by: _____ **Date:** _____

Date Rec'd: **Date Ret'd:** **Attachments**

Copies: **□Architect** **□Contractor** **□Consultant** **□Owner** **□ Others**

SUBSTITUTION REQUEST

(During the Bidding Phase)

Project: _____

_____

To: _____

_____

Re: _____

_____

Substitution Request Number: _____

From: _____

Date: _____

A/E Project Number: _____

Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The 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 have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01 33 00.

☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 33 00.

☐ Substitution rejected - Use specified materials.

☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

Supporting Data Attached ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTIONS

A. Work under this Section includes providing selective demolition of existing structures and surface features as shown on the drawing and as specified herein.

B. Work under this Section also includes EPA reporting, testing (unless previously provided to the Contractor), and disposal of structures containing asbestos. The EPA required reporting is required regardless if asbestos is encountered or not.

1.2 CONDITION OF STRUCTURES

A. Owner assumes no responsibility for actual conditions of items or structures to be demolished. Conditions existing at time of commencement of contract will be the responsibility of the Contractor.

1.3 PROTECTION OF FACILITIES

A. Protect from damage existing finish work that is to remain in place that becomes exposed during demolition operations.

B. Protect adjacent areas with suitable coverings when necessary to prevent surface damage, including protecting existing concrete and asphalt surfaces from concrete staining.

C. Remove protections at completion of work.

1.4 ENVIRONMENTAL CONTROLS

A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

1.5 ASBESTOS REQUIREMENTS

A. Completing the National Emission Standards for Hazardous Air Pollutants (NESHAP) sampling, testing, submitting the EPA notification and any other required submittals as incidental to the Work.

B. The project includes structures with a potential for asbestos containing material (materials other than metal, glass, or PVC plastic). Comply with the following regulations:

1. (NESHAP Regulations 40 CFR 61

2. Toxic Substances Control Act – Asbestos 40 CFR 763

3. Asbestos Hazard Emergency Response Act (AHERA)

4. Relevant OSHA Standards

C. If asbestos is discovered in the course of the demolition Work that exceeds the threshold amounts as defined in NESHAP 40 CFR 61.145, comply with the requirements for asbestos containing materials in all of the above listed regulations and standards.

1.6 PERMITS

A. Obtain any permits for building, electrical, or plumbing demolition that may be required for the Work at no additional costs.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSPECTION

A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions of surrounding area that could be misconstrued as damage resulting from selective demolition work.

3.2 ASBESTOS SAMPLING, TESTING, HANDLING, SHIPPING, AND DISPOSAL

A. Prior to any demolition or renovation, have a National Emissions Standards for Hazardous Air Pollution (NESHAP), Asbestos Hazard Emergency Response Act (AHERA) or Environmental Protection Agency (EPA) certified inspector inspect and collect appropriate samples to determine the presence of Asbestos Containing Material (ACM) in the structure.

B. Have the collected samples analyzed at a certified asbestos analytical laboratory.

C. Generate and submit a copy of the inspection report to the Engineer.

D. If ACM is found and is below the threshold quantities as defined in NESHAP 40 CFR 61.145 Standard for Demolition and Renovation, or if ACM is not present on structures being renovated, complete the EPA Notification requirements below.

3.3 EPA NOTIFICATION REQUIREMENTS

A. Regardless if ACM is found or not, complete a Notification of Demolition/Renovation in writing and submit to the EPA at least 10 days prior to the start of demolition/renovation operations, as outlined in NESHAP 40 CFR 61.145. Use of the following form is recommended.

1. http://www.epa.gov/region10/pdf/asbestos/demolition-renovation-notification-form_fillable.pdf

B. Submit a copy of the notification to the Engineer for concurrence prior to the EPA submittal. Allow 10 working days for Engineer concurrence. Upon concurrence, submit notification to the EPA Region 10 office. At the following address:

Asbestos NESHAP Coordinator
U.S. Environmental Protection Agency
Region 10 Office of Compliance and Enforcement (OCE-101)
1200 Sixth Avenue, Suite 900
Seattle, WA 98101

3.4 PREPARATION

A. Provide shoring, bracing, or support to prevent movement, settlement, or collapse of adjacent facilities to remain.

B. Cease operations immediately if safety of structure or existing facility appears to be endangered. Take precautions to support structure/facilities until determination is made for continuing operations.

3.5 DEMOLITION

A. Demolish concrete flatwork only in areas shown on the drawings to be removed. However, the exact location may be adjusted in the field if required to avoid existing obstacles.

1. The line to be cut shall be marked on the surface along a string-line or straight edge with a marker that will not wash away from the action of the saw's cooling water. All cutting lines shall be marked along straight line prior to cutting.

2. Furnish and operate a power drive, self-propelled wheel mounted pavement sawing machine. The saw blade shall be either a wet cutting or dry cutting type. The depth of the saw shall be controlled by graduated positions set on the machine.

3. Concrete and asphalt slabs shall be cut by saw cutting the slab to full slab depth with one pass of the saw following exactly along the marked cutting line.

B. Where large power driven saws cannot be operated close enough to the end of the slab to completely cut it (i.e. at an abutting wall or foundation) use power driven impact tools and grinders to remove the slab and form a smooth neat joint.

C. Where slab thicknesses exceed the maximum depth of the cutting machine, cut a line as deep as possible with the machine and use power driven impact tolls and grinders to remove the slab and form a smooth neat joint.

D. Remove all foundations shown to be removed. Do not bury unless authorized by the Engineer at the time of demolition.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubble and other materials resulting from demolition work. Haul all materials from demolition to a disposal site obtained by the Contractor.

3.7 CLEANUP AND REPAIR

A. Upon completion of demolition work, remove tools, equipment, and demolished materials from site.

3.8 REPAIR

A. Repair demolition performed in excess of that required. Return structures and surfaces to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

DIVISION 03 CONCRETE

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Formwork for cast-in place concrete
2. Shoring, bracing, and anchorage
3. Form accessories
4. Form stripping

B. Related Sections:
1. Section 03 20 00 - Concrete Reinforcing
2. Section 03 30 00 - Cast-In-Place Concrete
3. Section 05 50 00 - Metal Fabrications: Product requirements for metal fabrications for placement by this Section

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials
2. ACI 301 - Specifications for Structural Concrete
3. ACI 318 - Building Code Requirements for Structural Concrete
4. ACI 347 - Guide to Formwork for Concrete

1.3 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 318 O2 conform to design and applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 347, ACI 301, and ACI 318

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Products storage and handling requirements

B. Deliver void forms and installation instructions in manufacturer's packaging

C. Store off ground in ventilated and protected manner to prevent deterioration from moisture

1.6 COORDINATION

A. Section 01 31 00 – Project Management and Coordination.

B. Coordinate this Section with other sections of work, requiring attachment of components to formwork

PART 2 - PRODUCTS

2.1 WOOD FORM MATERIALS

A. Plywood: Douglas Fir species; select sheathing, tight face select sheathing grade; sound undamaged sheets with clean, true edges

B. Lumber Forms:
   1. Application: Use for edge forms and unexposed finish concrete
   2. Boards: 6 inches or 8 inches in width, ship lapped, or tongue and groove, "Standard" Grade Douglas Fir, conforming to WCLIB Standard Grading Rules for West Coast Lumber
   3. Surface boards on four sides

C. Plywood Forms:
   1. Application: Use for exposed finish concrete
   2. Forms: Conform to PS 1; full size 4 x 8 feet panels; each panel labeled with grade trademark of APA/EWA
   3. Plywood for Surfaces to Receive Membrane Waterproofing: Minimum of 5/8 inch thick; APA/EWA "B-B Plyform Structural I Exterior" grade
   4. Plywood where "Smooth Finish" is required, as indicated on Drawings: APA/EWA "HD Overlay Plyform Structural I Exterior" grade, minimum of 3/4 inch thick

2.2 PREFABRICATED FORMS

A. Manufacturers:
   1. EFCO - Economy Forms Corp
   2. Sonoco Products Co
   3. Symons by Dayton Superior
   4. Wall-Ties & Forms, Inc
   5. Western Forms.
   6. Substitutions: Section 01 60 00 - Product Requirements

B. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces

C. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces

D. Steel Forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings

E. Form Liners: Smooth, durable, grainless and non-staining hardboard, unless otherwise indicated on Drawings

F. Framing, Studding and Bracing: Stud or No 3 structural light framing grade

2.3 FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, galvanized metal, fixed length, cone type, free of defects capable of leaving holes larger than 1 inch in concrete surface
   1. Manufacturers:
      a. Heckmann Building Products, Inc
      b. Symons by Dayton Superior
      c. Wall-Ties & Forms, Inc

d. Substitutions: Section 01 60 00 - Product Requirements

B. Spreaders: Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face
1. Wire ties, wood spreaders or through bolts are not permitted

C. Form Anchors and Hangers:
1. Do not use anchors and hangers exposed concrete leaving exposed metal at concrete surface
2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member
3. Penetration of structural steel members is not permitted

D. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete
1. Manufacturers:
a. Architectural Concrete Chemicals, LLC
b. Nox-Crete Products Group
c. Substitutions: Section 01 60 00 - Product Requirements

E. Bituminous Joint Filler: ASTM D1751

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 Execution: Coordination and project conditions

B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings

C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect

3.2 INSTALLATION

A. Earth Forms:
1. Earth forms are not permitted

B. Formwork - General:
1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted
2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations
3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings
4. Carefully verify horizontal and vertical positions of forms
a. Correct misaligned or misplaced forms before placing concrete
5. Complete wedging and bracing before placing concrete

C. Forms for Smooth Finish Concrete:

1. Use steel, plywood or lined board forms
2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish
3. Use care in forming and stripping wood forms to protect corners and edges
4. Level and continue horizontal joints
5. Keep wood forms wet until stripped

D. Framing, Studding and Bracing:
1. Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood
2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations
3. Construct beam soffits of material minimum of 2 inches thick
4. Distribute bracing loads over base area on which bracing is erected
5. When placed on ground, protect against undermining, settlement or accidental impact

E. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 and ACI 318

F. Arrange and assemble formwork to permit dismantling and stripping
1. Do not damage concrete during stripping
2. Permit removal of remaining principal shores

G. Obtain Architect 's approval before framing openings in structural members not indicated on Drawings

H. Install void forms in accordance with manufacturer's recommendations

I. Do not reuse wood formwork for concrete surfaces to be exposed to view
1. Do not patch formwork

3.3 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 are indicated to receive special finishes or applied coverings that are affected by agent
1. Soak inside surfaces of untreated forms with clean water
2. Keep surfaces coated prior to placement of concrete

D. Reuse and Coating of Forms:
1. Thoroughly clean forms and reapply form coating before each reuse
2. For exposed work, do not reuse forms with damaged faces or edges
3. Apply form coating to forms in accordance with manufacturer's specifications
4. Do not coat forms for concrete indicated to receive "scored finish"
5. Apply form coatings before placing reinforcing steel

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Install formed openings for items to be embedded in or passing through concrete work

B. Locate and set in place items required to 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. 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

E. 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

F. Form Ties:
   1. Use sufficient strength and sufficient quantity to prevent spreading of forms
   2. Place ties at least 1 inch away from finished surface of concrete
   3. Leave inner rods in concrete when forms are stripped
   4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings

G. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete

H. Construction Joints:
   1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints
   2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage
   3. Show no overlapping of construction joints
   4. Construct joints to present same appearance as butted plywood joints
   5. Arrange joints in continuous line straight, true and sharp

I. Embedded Items:
   1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features
   2. Do not embed wood or uncoated aluminum in concrete
   3. Obtain installation and setting information for embedded items furnished under other Specification sections
   4. Securely anchor embedded items in correct location and alignment prior to placing concrete
   5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations

J. Openings for Items Passing Through Concrete:
   1. Frame openings in concrete where indicated on Drawings
   2. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections
   3. Coordinate work to avoid cutting and patching of concrete after placement
   4. Perform cutting and repairing of concrete required as result of failure to provide required openings

K. Screeds:
   1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs
   2. Slope slabs to drain where required or as shown on Drawings
   3. Before depositing concrete:
      a. Remove debris from space to be occupied by concrete and thoroughly wet forms
      b. Remove freestanding water

L. Screed Supports:
   1. For concrete over waterproof membranes and vapor retarder membranes, use cradle,

pad or base type screed supports which will not puncture membrane
2. Staking through membrane is not be permitted

M. Cleanouts and Access Panels:
1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material
2. Clean forms and surfaces against which concrete is to be placed
a. Remove chips, saw dust and other debris
b. Thoroughly blow out forms with compressed air just before concrete is placed

3.5 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms

B. Clean formed cavities of debris prior to placing concrete

C. Flush with water or use compressed air to remove remaining foreign matter
1. Ensure that water and debris drain to exterior through clean-out ports

D. During cold weather:
1. Remove ice and snow from within forms
2. Do not use de-icing salts
3. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure
4. Use compressed air or other means to remove foreign matter

3.6 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect

B. Loosen forms carefully
1. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged
1. Discard damaged forms

D. Leave forms in place for minimum number of days as specified in ACI 347

3.7 ERECTION TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301 and ACI 318

3.8 FIELD QUALITY CONTROL

A. Section: Field inspecting, testing, adjusting, and balancing.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure

C. Notify Architect after placement of reinforcing steel in forms, but prior to placing concrete

D. Schedule concrete placement to permit formwork inspection before placing concrete

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Reinforcing bars
   2. Welded wire fabric
   3. Reinforcement accessories

B. Related Sections:
   1. Section 03 10 00 - Concrete Forming and Accessories
   2. Section 03 30 00 - Cast-In-Place Concrete
   3. Section 03 35 00 - Concrete Finishing: Reinforcement for concrete floor toppings

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete
   2. ACI 318 - Building Code Requirements for Structural Concrete
   3. ACI 530.1 - Specifications for Masonry Structures
   4. ACI SP-66 - ACI Detailing Manual

B. ASTM International:
   1. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
   2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
   3. A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
   4. ASTM A496/A496M - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
   5. ASTM A497/A497M - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
   6. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

C. American Welding Society:
   1. AWS D1.4 - Structural Welding Code - Reinforcing Steel

D. Concrete Reinforcing Steel Institute:
   1. CRSI - Manual of Standard Practice
   2. CRSI - Placing Reinforcing Bars

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Shop Drawings: Indicate bar sizes, spacing, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements

1. Submit certified copies of mill test report of reinforcement materials analysis

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with CRSI - Manual of Standard Practice, ACI 301 and ACI 318

B. Prepare shop drawings in accordance with ACI SP-66

1.5 QUALIFICATIONS

A. Welders: AWS qualified within previous 12 months

1.6 COORDINATION

A. Section 01 31 00 Project Management and Coordination

B. Coordinate with placement of formwork, formed openings and other Work

PART 2 - PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, uncoated finish

B. Plain Wire: ASTM A82/A82M; unfinished

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions

C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: type; size and shape to meet Project conditions

2.3 FABRICATION

A. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice, ACI 318 and applicable code

B. Form standard hooks for stirrup and tie hooks, and seismic hooks as indicated on Drawings

C. Form reinforcement bends with minimum diameters in accordance with ACI 318 and applicable code

D. Fabricate column reinforcement with offset bends at reinforcement splices

E. Weld reinforcement in accordance with AWS D1.4

F. Locate reinforcement splices not indicated on Drawings, at point of minimum stress
1. Review location of splices with Architect

PART 3 - EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement

1. Do not deviate from required position beyond specified tolerance
    a. Do not weld crossing reinforcement bars for assembly except as permitted by Architect

B. Do not displace or damage vapor retarder

C. Accommodate placement of formed openings

D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318
1. Where bars are indicated in multiple layers, place upper bars directly above lower bars

E. Maintain concrete cover around reinforcement as follows:

Reinforcement Location		Minimum Concrete Cover
Footings and Concrete Formed Against Earth		3 inches
Concrete exposed to earth or weather	No. 6 bars and larger	2 inches
	No. 5 bars and smaller	1-1/2 inches

F. Splice reinforcing where indicated on Drawings in accordance with splicing device manufacturer's instructions

3.2 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing

B. Perform field inspection and testing in accordance with ACI 318

C. Provide free access to Work and cooperate with appointed firm

D. Reinforcement Inspection:
1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances
2. Welding: Inspect welds in accordance with AWS D1.1
3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing
4. Weldability Inspection: Inspect for reinforcement weldability when formed from steel other than ASTM A706/A706M
5. Periodic Weld Inspection: Other welded connections

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete for the following:
1. Foundation walls
2. Slabs on grade
3. Control, expansion and contraction joint devices
4. Equipment pads
5. Light pole base
6. Thrust blocks
7. Manholes

B. Related Sections:
1. Section 03 10 00 - Concrete Forming and Accessories: Formwork and accessories Placement of joint device, and joint device anchors in formwork
2. Section 03 20 00 - Concrete Reinforcing
3. Section 03 35 00 - Concrete Finishing
4. Section 03 39 00 - Concrete Curing
5. Section 07 90 00 - Joint Protection
6. Section 32 13 13 - Concrete for Exterior Improvements: Sidewalks, curbs and gutters

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete
2. ACI 305 - Hot Weather Concreting
3. ACI 306.1 - Standard Specification for Cold Weather Concreting
4. ACI 308.1 - Standard Specification for Curing Concrete
5. ACI 318 - Building Code Requirements for Structural Concrete

B. ASTM International:
1. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C33 - Standard Specification for Concrete Aggregates
3. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete
5. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete
6. ASTM C150 - Standard Specification for Portland Cement
7. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete
8. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
9. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
10. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete
11. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete
12. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete

13. ASTM C595 - Standard Specification for Blended Hydraulic Cements
14. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
15. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing
16. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
17. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
18. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
19. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
20. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
21. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials
22. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
23. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs
24. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

1.3 PERFORMANCE REQUIREMENTS

A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96/E96M

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit data on joint devices, attachment accessories, and admixtures

C. Design Data:
   1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
      a. Hot and cold weather concrete work
      b. Air entrained concrete work
   2. Identify mix ingredients and proportions, including admixtures

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Closeout Procedures

B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301

B. Conform to ACI 305 when concreting during hot weather

C. Conform to ACI 306.1 when concreting during cold weather

D. Acquire cement and aggregate from one source for Work

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site

B. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days

1.8 COORDINATION

A. Section 01 31 00 – Project Management and Coordination

B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II - Moderate Portland type; Normal Weight Aggregates: ASTM C33

B. Aggregate: Maximum size in accordance with ACI 318

C. Water: ACI 318; potable

2.2 ADMIXTURES

A. Manufacturers:
1. Euclid Chemical Company
2. GPC Applied Technologies
3. Green Umbrella
4. Sika Corporation
5. Substitutions: Section 01 60 00 - Product Requirements

B. Air Entrainment: ASTM C260

C. Chemical: Not allowed without prior written approval from the Architect

D. Fly Ash or Calcined Pozzolan: ASTM C618; Not allowed without prior written approval from the Architect

E. Silica Fume: ASTM C1240

F. Plasticizing: ASTM C1017/C1017M; Not allowed without prior written approval from the Architect

2.3 ACCESSORIES

A. Bonding Agent: polysulfide polymer epoxy
1. Manufacturers:
a. Euclid Chemical Company
b. QUIKRETE
c. Sika Corporation
d. W.R. Meadows, Inc

e. Substitutions: Section 01 60 00 - Product Requirements

B. Vapor Retarder: ASTM E1745 Class A; 15 mil thick clear polyethylene film fabric reinforced plastic film; type recommended for below grade application
1. Furnish joint tape recommended by manufacturer.
2. Manufacturers:
a. GCP Applied Technologies - FLORPRUFE
b. Stego Industries, LLC
c. W.R. Meadows, Inc
d. Substitutions: Section 01 60 00 - Product Requirements

2.4 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler: ASTM D1751 or ASTM D994; Asphalt impregnated fiberboard or felt, 1/2 inch thick; tongue and groove profile

B. Construction Joint Devices: Integral galvanized steel or extruded plastic; slab thickness, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge

C. Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient elastomeric vinyl or neoprene filler strip with Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum cover plate, of longest manufactured length at each location, flush or recessed mounted; color as selected

D. Sealant and Primer: Type, as specified in Section 07 90 00

2.5 CONCRETE MIX

A. Select proportions for concrete in accordance with ACI 318 field experience

B. Provide concrete to the following criteria:
1. All exposed exterior slab on grade, stem wall, columns, and beams

Material and Property	Measurement
Compressive Strength (28 day)	4500 psi
Cement Type	ASTM C150
Minimum Cement	6.0 sacks per cubic yard
Water-Cement Ratio (maximum)	0.45 by weight (mass)
Air Content (Do not use with towel finish)	5.5 percent plus or minus 1 percent
Slump	3 inches plus or minus 1 inch

2. All footings

Material and Property	Measurement
Compressive Strength (28 day)	3500 psi
Cement Type	ASTM C150
Minimum Cement	5.75 sacks per cubic yard

Water-Cement Ratio (maximum)	0.50 by weight (mass)
Air Content (Do not use with towel finish)	5.5 percent plus or minus 1 percent
Slump	4 inches plus or minus 1 inch

3. All Interior slab-on-grade

Material and Property	Measurement
Compressive Strength (28 day)	3500 psi
Cement Type	ASTM C150
Minimum Cement	5.0 sacks per cubic yard
Water-Cement Ratio (maximum)	0.45 by weight (mass)
Air Content (Do not use with towel finish)	0 percent plus or minus 1.5 percent
Slump	3 inches plus or minus 1 inch

C. Admixtures: Include admixture types and quantities indicated in concrete mix designs only when approved by Architect
   1. Use accelerating admixtures in cold weather. Use of admixtures will not relax cold weather placement requirements
   2. Do not use calcium chloride nor admixtures containing calcium chloride
   3. Use set retarding admixtures during hot weather
   4. Add air entrainment admixture to concrete mix for work exposed to freezing and thawing
   5. For concrete exposed to deicing chemicals, limit fly ash, pozzolans, silica fume, and slag content as required by applicable code

D. Average Compressive Strength Reduction: Not permitted

E. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 – Execution.

B. Verify requirements for concrete cover over reinforcement

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout

C. Remove debris and ice from formwork, reinforcement, and concrete substrates

D. Remove water from areas receiving concrete before concrete is placed

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301 and ACI 318.

B. Notify testing laboratory and Architect a minimum 24 hours prior to commencement of operations

C. Ensure reinforcement, inserts, embedded parts, formed 11expansion and contraction joints are not disturbed during concrete placement

D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643
   1. Lap joints minimum 6 inches and seal watertight by adhesive applied between overlapping edges and ends or taping edges and ends

E. Repair vapor retarder damaged during placement of concrete reinforcing
   1. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight

F. Separate exterior slabs on grade from vertical surfaces with 1/2 inch thick joint filler

G. Place joint filler in floor slab pattern placement sequence
   1. Set top to required elevations Secure to resist movement by wet concrete

H. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface
   1. Conform to Section 07 90 00 for finish joint sealer requirements

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. Install joint device anchors
   1. Maintain correct position to allow joint cover to be flush with floor and/or wall finish

K. Install joint covers in longest practical length, when adjacent construction activity is complete

L. Apply sealants in joint devices in accordance with Section 07 90 00

M. Deposit concrete at final position
   1. Prevent segregation of mix

N. Place concrete in continuous operation for each panel or section determined by predetermined joints

O. Consolidate concrete

P. Maintain records of concrete placement
   1. Record date, location, quantity, air temperature, and test samples taken

Q. Place concrete continuously between predetermined expansion, control, and construction joints

R. Do not interrupt successive placement; do not permit cold joints to occur

S. Place floor slabs in checkerboard or saw cut pattern indicated

T. Saw cut joints within 12 hours after placing
   1. Contractor to provide saw-cut layout prior to placing concrete for review and approval by architect and engineer of record.
   2. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness

U. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/8 inch in 10 ft

3.4 CONCRETE FINISHING

A. Provide formed concrete surfaces to be left exposed concrete walls columns beams joists with sack rubbed finish

B. Finish concrete floor surfaces to requirements of Section 03 35 00

C. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/8 inch per foot nominal or as indicated on drawings

D. Provide control joint or saw cut at grade break line where floor slopes to floor drain

3.5 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury
   1. Protect concrete footings from freezing for minimum 5 days

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete

C. Cure concrete floor surfaces as specified in Section 03 39 00.

3.6 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing

B. Perform field inspection and testing in accordance with ACI 318 and applicable code

C. Provide free access to Work and cooperate with appointed firm

D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work

E. Concrete Inspections:
   1. Periodic Curing Inspection: Inspect for proper installation procedures, specified curing temperature and procedures

F. Strength Test Samples:
   1. Sampling Procedures: ASTM C172
   2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, field cured
   3. Sample concrete and make one set of three cylinders for every 25 cu yds or less of each class of concrete placed each day and for every 100 cubic yards thereafter
   4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from randomly selected batches
   5. Make one additional cylinder during cold weather concreting, and field cure

G. Field Testing:
   1. Slump Test Method: ASTM C143/C143M
   2. Air Content Test Method: ASTM C173/C173M and ASTM C231
   3. Temperature Test Method: ASTM C1064/C1064M
   4. Measure slump and temperature for each compressive strength concrete sample
   5. Measure air content in air-entrained concrete for each compressive strength concrete sample

H. Cylinder Compressive Strength Testing:
   1. Test Method: ASTM C39/C39M
   2. Test Acceptance: In accordance with ACI 318
   3. Test one cylinder at 7 days
   4. Test two cylinders at 28 days
   5. Dispose remaining cylinders when testing is not required

I. Maintain records of concrete placement.
   1. Record date, location, quantity, air temperature, and test samples taken

3.7 PATCHING

A. Allow Architect to inspect concrete surfaces immediately upon removal of forms

B. Excessive honeycomb or embedded debris in concrete is not acceptable
   1. Notify Architect upon discovery

C. Patch imperfections as directed by Architect

3.8 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements

B. Repair or replacement of defective concrete will be determined by Architect

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area

3.9 SCHEDULE - CONCRETE TYPES

A. Refer to Structural Drawings

END OF SECTION

SECTION 03 35 00

CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Finishing concrete floors
2. Floor surface treatment

B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete: Prepared concrete floors ready to receive finish; control and formed expansion and contraction joints and joint devices
2. Section 03 39 00 - Concrete Curing
3. Section 07 90 00 - Joint Protection

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete
2. ACI 302.1 - Guide for Concrete Floor and Slab Construction

B. ASTM International:
1. ASTM E1155 - Standard Test Method for Determining Floor Flatness and of Levelness Using the F-number System

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit data on concrete hardener**,** sealer, curing compounds, coatings, and slip resistant treatment, compatibilities, and limitations

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Closeout Procedures

B. Operation and Maintenance Data: Submit data on maintenance renewal of applied coatings

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301and ACI 302.1

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience

B. Applicator: Company specializing in performing work of this section with minimum three years documented experience and approved by the manufacturer

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements

B. Deliver materials in manufacturer's packaging including application instructions

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site

B. Temporary Lighting: Minimum 200 W light source, placed 8 feet above floor surface, for each 425 sq ft of floor being finished

C. Do not finish floors until interior ambient temperature is above of 50 degrees F

D. Ventilation: Sufficient to prevent injurious gases from temporary heat or other sources affecting concrete

1.9 COORDINATION

A. Section 01 31 00 – Project Management and Coordination

B. Coordinate the Work with concrete floor placement and concrete floor curing

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
1. Dayton Superior Corporation
2. Euclid Chemical Company
3. L&M Construction Chemicals, Inc
4. W.R Meadows, Inc
5. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPOUNDS - HARDENERS AND SEALERS

A. Curing: Type, as specified in Section 03 39 00

B. Hardener: non-yellowing, liquid type
1. Manufacturers:
   a. Dayton Superior Corporation
   b. Euclid Chemical Company
   c. L&M Construction Chemicals, Inc
   d. W.R Meadows, Inc
   e. Substitutions: Section 01 60 00 - Product Requirements

C. Stain Resistance Concrete Protection: non-yellowing sealer, resistance to chemicals, petroleum product, oils, and greases
1. Manufacturers:
   a. Dayton Superior Corporation - Tuf Seal J35
   b. L&M Construction Chemicals, Inc
   c. W.R Meadows, Inc
   d. Sika – Sikagard
   e. Prosoco – Concrete Protector SB
   f. Substitutions: Section 01 60 00 - Product Requirements

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution

B. Verify floor surfaces are acceptable to receive the Work of this section

3.2 FLOOR FINISHING

A. Cure concrete floor surfaces as specified in Section 03 39 00

B. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1

C. Steel trowel surfaces receiving carpeting, resilient flooring, seamless flooring, and thin set ceramic tile

D. Steel trowel surfaces which are indicated to be exposed

E. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains at 1/8 inch per foot nominal

3.3 FLOOR SURFACE TREATMENT

A. Apply hardener on floor surfaces

B. Apply sealer on floor surfaces

3.4 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

B. Maximum Variation of Surface Flatness For Exposed Concrete Floors: 1/8 inch in 10 ft

C. Maximum Variation of Surface Flatness Under Seamless Resilient Flooring: 1/8 inch in 10 ft

D. Maximum Variation of Surface Flatness Under Carpeting: 1/8 inch in10 ft

E. Correct defects in defined traffic floor by grinding or removal and replacement of defective Work
   1. Areas requiring corrective Work will be identified
   2. Re-measure corrected areas by same process

3.5 SCHEDULES

A. Refer to Room Finish Schedule for floor finishes

END OF SECTION

SECTION 03 39 00

CONCRETE CURING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes initial and final curing of horizontal and vertical concrete surfaces

B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 03 35 00 - Concrete Finishing

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete
2. ACI 302.1 - Guide for Concrete Floor and Slab Construction
3. ACI 308.1 - Standard Specification for Curing Concrete
4. ACI 318 - Building Code Requirements for Structural Concrete

B. ASTM International:
1. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
3. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
4. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit data on curing compounds, mats, paper, film, compatibilities, and limitations

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 30, ACI 302.1, and ACI 318

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements

B. Deliver curing materials in manufacturer's packaging including application instructions

PART 2 - PRODUCTS

2.1 MATERIALS

A. Membrane Curing Compound Type B: ASTM C1315 Type I, Class A
1. Manufacturers:
a. Dayton Superior Specialty Chemicals
b. Euclid Chemical Company L&M Construction Chemicals, Inc
c. W.R. Meadows, Inc
d. Nox-Crete Products Group

e. Substitutions: Section 01 60 00 - Product Requirements

B. Non-Membrane Forming Curing Compound Type C: Liquid, penetrating siliconate based type; combination curing, hardening and dust-proofing compound
   1. Manufacturers:
      a. L&M Construction Chemicals, Inc
      b. Nox-Crete Products Group Vexcon Chemicals Inc
      c. Substitutions: Section 01 60 00 - Product Requirements

C. Absorptive Mats: ASTM C171, burlap-polyethylene, minimum 9 oz/sq yd bonded to prevent separation during handling and placing

D. Water: Potable, not detrimental to concrete

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution

B. Verify substrate surfaces are ready to be cured

3.2 INSTALLATION - HORIZONTAL SURFACES

A. Cure concrete in accordance with ACI 308.1

B. Membrane Curing Compound: Apply curing compound in two coats with second coat applied at right angles to first

C. Install Non-Membrane Forming Curing Compound Type C, in areas to receive floor finishes adhered to the concrete slab

3.3 INSTALLATION - VERTICAL SURFACES

A. Cure concrete in accordance with ACI 308.1

B. Membrane Curing Compound: Apply compound in two coats with second coat applied at right angles to first

3.4 PROTECTION OF FINISHED WORK

A. Section 01 73 00 - Execution: Protection of finished Work

B. Do not permit traffic over unprotected floor surface

END OF SECTION

SECTION 03 60 00

GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Portland cement grout
2. Non-shrink cementitious grout

B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
2. ACI 318 - Building Code Requirements for Structural Concrete

B. American Society of Testing and Materials:
1. ASTM C33 - Standard Specification for Concrete Aggregates
2. ASTM C40 - Test Method for Organic Impurities in Fine Aggregates for Concrete
3. ASTM C150 - Standard Specification for Portland cement
4. ASTM C191 - Test Method for Time of Setting of Hydraulic Cement by Vicat Needle
5. ASTM C307 - Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings
6. ASTM C531 - Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes
7. ASTM C579 - Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, monolithic Surfacings and Polymer Concretes

C. ASTM C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures

D. U. S. Army Corps of Engineers Concrete Research Division (CRD):
1. CRD C621 - Non-Shrink Grout

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Product Data: Submit product data on grout

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Deliver grout in manufacturer's unopened containers with proper labels intact

C. Store grout in a dry shelter, protect from moisture

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site

B. Maintain minimum temperature of 45 degrees F before, during, and after grouting, until grout has set

PART 2 - PRODUCTS

2.1 PORTLAND CEMENT GROUT MATERIALS

A. Portland cement: ASTM C150, Type I and II

B. Water:
1. Potable; containing no impurities, suspended particles, algae or dissolved natural salts in quantities capable of causing:
   a. Corrosion of steel
   b. Volume change increasing shrinkage cracking
   c. Efflorescence
   d. Excess air entraining

C. Fine Aggregate:
1. Washed natural sand
2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits
3. Free from injurious amounts of organic impurities as determined by ASTM C40

D. Mix:
1. Portland cement, sand and water
2. Do not use ferrous aggregate or staining ingredients in grout mixes

2.2 NON-SHRINK CEMENTITIOUS GROUT

A. Manufacturers:
1. Euclid Chemical Company
2. L&M Construction Chemicals, Inc
3. Quikrete
4. Sika Corporation
5. Substitutions: Section 01 60 00 - Product Requirements

B. Non-shrink Cementitious Grout: Pre-mixed ready for use formulation requiring only addition of water; non-shrink, non-corrosive, non-metallic, non-gas forming, no chlorides

C. Properties: Certified to maintain initial placement volume or expand after set and meet the following minimum properties when tested in accordance with CRD-C621, for Type D non-shrink grout:

D. Properties

	Test	Time	Result
Setting Time	ASTM C191	Initial	2 hours (Approx)
		Final	3 hours (Approx)
Expansion			0.10% - 0.4% Maximum
Compressive	CRD-C621	1 day	4,000 psi

Strength		7 days	7,000 psi
		28 days	10,000 psi to 10,800 psi

2.3 FORMWORK

A. Refer to Section 03 10 00 for formwork requirements

2.4 CURING

A. Prevent rapid loss of water from grout during first 48 hours by use of approved membrane curing compound or with use of wet burlap method

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 31 00 – Project Management and Coordination: Verification of existing conditions before starting work

B. Verify areas to receive grout

3.2 PREPARATION

A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved

B. Rough concrete lightly, but not enough to interfere with placement of grout

C. Remove foreign materials from metal surfaces in contact with grout

D. Align, level and maintain final positioning of components to be grouted

E. Saturate concrete surfaces with clean water; remove excess water, leave none standing

3.3 INSTALLATION - FORMWORK

A. Construct leak proof forms anchored and shored to withstand grout pressures

B. Install formwork with clearances to permit proper placement of grout

3.4 MIXING

A. Portland Cement Grout:
   1. Use proportions of 2 parts sand and 1 part cement, measured by volume
   2. Prepare grout with water to obtain consistency to permit placing and packing
   3. Mix water and grout in two steps; pre-mix using approximately 2/3 of water; after partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing 2 to 3 minutes
   4. Mix only quantities of grout capable of being placed within 30 minutes after mixing
   5. Do not add additional water after grout has been mixed
   6. Capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days

B. Mix and prepare non-shrink cementitious grout in accordance with manufacturer's instructions
   1. Capable of developing minimum compressive strength of 2400 psi in 48 hours and

7000 psi in 28 days

C. Mix grout components in proximity to work area and transport mixture quickly and in manner not permitting segregation of materials

3.5 PLACING GROUT

A. Place grout material quickly and continuously

B. Do not use pneumatic-pressure or dry-packing methods

C. Apply grout from one side only to avoid entrapping air

D. Do not vibrate placed grout mixture, or permit placement when area is being vibrated by nearby equipment

E. Thoroughly compact final installation and eliminate air pockets

F. Do not remove leveling shims for at least 48 hours after grout has been placed

3.6 CURING

A. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury

B. After grout has attained its initial set, keep damp for minimum of 3 days

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing

B. Field inspection and testing will be performed in accordance with ACI 301, ACI 318 and under provisions of Section 01 40 00 - Quality Requirements

C. Submit proposed mix design of each class of grout to testing firm for review prior to commencement of Work

D. Tests of grout components may be performed to ensure conformance with specified requirements

END OF DIVISION

DIVISION 04 MASONRY

SECTION 04 05 03

MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes mortar and grout for masonry

B. Related Sections
1. Section 04 20 19 – Veneer Unit Masonry
2. Section 08 12 14 - Standard Steel Frames: Grouting steel door frames

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 530 - Building Code Requirements for Masonry Structures
2. ACI 530.1 - Specifications for Masonry Structures

B. ASTM International:
1. ASTM C5 - Standard Specification for Quicklime for Structural Purposes
2. ASTM C91 - Standard Specification for Masonry Cement
3. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
4. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete
5. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar
6. ASTM C150 - Standard Specification for Portland Cement
7. ASTM C206 - Standard Specification for Finishing Hydrated Lime
8. ASTM C270 - Standard Specification for Mortar for Unit Masonry
9. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete
10. ASTM C404 - Standard Specification for Aggregates for Masonry Grout
11. ASTM C476 - Standard Specification for Grout for Masonry
12. ASTM C595 - Standard Specification for Blended Hydraulic Cements
13. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
14. ASTM C1019 - Standard Test Method for Sampling and Testing Grout
15. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms
16. ASTM C1329 - Standard Specification for Mortar Cement
17. ASTM C1357 - Standard Test Method for Evaluating Masonry Bond Strength

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements

B. Samples: Submit samples of mortar, illustrating mortar color and color range

C. Design Data: Submit design mix when Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements

B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F

C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Portland Cement: ASTM C150, Type I, gray color

B. Masonry Cement: ASTM C91, Type S, gray color

C. Mortar Cement: ASTM C1329, Types S, gray color

D. Mortar Aggregate: ASTM C144, standard masonry type

E. Hydrated Lime: ASTM C206, Type S

F. Quicklime: ASTM C5, non-hydraulic type

G. Grout Aggregate: ASTM C404, fine and coarse

H. Water: Clean and potable

I. Mortar Color: Mineral oxide pigment; color as selected

J. Admixture: Request approval from Architect

K. Calcium chloride is not permitted

2.2 MIXES

A. Mortar Mixes:
1. Mortar For Structural Masonry: ASTM C270, Type S using Proportion specification
2. Mortar For Non-Structural Masonry: ASTM C270, Type S using Proportion specification

B. Mortar Mixing:
1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use
2. Achieve uniformly damp sand immediately before mixing process
3. Add mortar color and admixtures to achieve uniformity of mix and coloration
4. Re-temper only within two hours of mixing

C. Grout Mixes:
1. Grout for Non-Structural Masonry: 2,000 psi strength at 28 days; mixed in accordance with ASTM C476 Fine grout
2. Grout for Structural Masonry: 2,000 psi strength at 28 days; mixed in accordance with ASTM C476 Fine grout
3. Application:
   a. Fine Grout: For grouting other spaces

D. Grout Mixing:
1. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476

2. Add admixtures; mix uniformly

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 – Execution: Examination of Existing Conditions

B. Request inspection of spaces to be grouted.

3.2 PREPARATION

A. Apply bonding agent to existing concrete surfaces

3.3 INSTALLATION

A. Install mortar and grout in accordance with ACI 530.1 Specifications for Masonry Structures

B. Solid grout masonry units up first 4'-0" above foundation wall.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing

B. Establishing Mortar Mix: In accordance with ASTM C270

C. Testing of Mortar Mix: In accordance with ASTM C780 for aggregate ratio and water content, air content, consistency, and compressive strength

D. Testing of Grout Mix: In accordance with ASTM C1019 for compressive strength, and in accordance with ASTM C143/C143M for slump

E. Test flexural bond strength of mortar and masonry units to ASTM C1357; test in conjunction with masonry unit sections specified

F. Test compressive strength of mortar and masonry to ASTM C1314; test in accordance with masonry unit sections specified

END OF SECTION

SECTION 04 20 19

VENEER UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes facing brick units, reinforcement, anchorage, and accessories.

B. Related Sections:
1. Section 04 05 03 - Masonry Mortaring and Grouting: Product Requirements for Mortar and grout
2. Section 05 50 00 - Metal Fabrications: Execution requirements for loose steel lintels for placement by this section
3. Section 07 62 00 - Sheet Metal Flashing and Trim: Product requirements for reglets for flashings for placement by this section
4. Section 07 90 00 - Joint Protection: Rod and sealant at control and/or expansion joints

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 530 - Building Code Requirements for Masonry Structures
2. ACI 530.1 - Specifications for Masonry Structures

B. ASTM International:
1. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
4. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
5. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units
6. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
7. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

1.3 PERFORMANCE REQUIREMENTS

A. Clay Masonry Compressive Strength (f'm): 3,000 psi; determined by unit strength method

B. Concrete Masonry Compressive Strength (f'm): 1,350 psi; determined by unit strength method

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Samples: Submit four samples of face brick, units to illustrate color, texture and extremes of color range

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience

1.7 MOCKUP

A. Section 01 40 00 - Quality Requirements: Mockup requirements

B. Construct masonry 4'-0" X 2'-0" mockup; coordinate with architect for location as mock-up is intended to be left in place if accepted. Include field brick, mortar and accessories. Mock-up can be used as final construction if approved by Architect. Contractor to include in bid a minimum of three (3) mockups for review and approval. All materials to be submitted and approved prior to construction of mock-up.

C. Retain accepted mockup as completed Work or remove mockup as directed by Architect

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements

B. Accept masonry units on site and inspect for damage

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F

C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph

1.10 COORDINATION

A. Section 01 73 00 - Execution

B. Coordinate masonry work with installation of window and door anchors

PART 2 - PRODUCTS

2.1 FACE BRICK ASSEMBLIES

A. Manufacturers:
1. Endicott Clay Products Co.

2. Interstate Brick
3. The Belden Brick Co.
4. Robinson Brick Company
5. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPONENTS

A. Facing Brick: ASTM C216, Type FBX, Grade SW.
   1. Brick Size and Shape: Modular 3-5/8" x 2-1/4" x 7-5/8".
   2. Basis of design: Mutual Materials Blend of 2/3 Red Varitone and 1/3 Brown Varitone as per campus standard other manufactures will be considered with product samples that match color and pattern. All joints are to be Raked to match existing buildings on campus.
   3. All colors and patterns that differ from the basis of design must be approved prior to Bid.

2.3 ACCESSORIES

A. Veneer Anchors: Hohmann and Barnard thermal 2-seal wing nut anchor
   1. Size for 5/8" wallboard and 2” rigid insulation
   2. Use with stainless steel 2x hook.
      a. Length:
         1) 3" typical
         2) 7" at pilasters

B. Strap anchors; bend steel shape; size as required, adjustable as necessary, hot-dip galvanized to ASTM A153 finish

C. Wall Ties: Corrugated formed sheet metal, size as required**;** ASTM A153/A153M hot dip galvanized

D. Drainage Mat: CavClear Masonry Mat, 1" thick

E. Mortar and Grout: As specified in Section 04 05 03

F. Galvanized Steel: ASTM A653/A653M, G90 finish, 26-gage core steel

G. Joint Filler: Closed cell polyvinyl chloride, polyethylene, polyurethane, or rubber; oversized 50 percent to joint width x by maximum lengths; self-expanding

H. Weeps: Spaced 32" o.c.Preformed plastic tubes, hollow

I. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials

J. Steel Lintels: size as indicated on Drawings

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution

B. Verify field conditions are acceptable and are ready to receive work.

C. Verify items provided by other sections of work are properly sized and located.

D. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other sections.

B. Furnish temporary bracing during installation of masonry work.
   1. Maintain in place until the building structure provides permanent support.

C. Wet clay and shale brick before laying when initial rate of absorption is greater than 30 grams when tested in accordance with ASTM C67

3.3 INSTALLATION

A. Establish lines, levels, and coursing indicated.
   1. Protect from displacement.

B. Maintain masonry courses to uniform dimension.
   1. Form bed and head joints of uniform thickness

C. Coursing of Brick Units:
   1. Coordinate coursing with drawings and elevations.
   2. Coursing to match existing buildings on CSI campus.
   3. Unless otherwise indicated, lay exposed masonry in running bond and stack bond where indicated in drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
   4. Coursing: three units and three mortar joints to equal 8"
   5. Mortar Joints: raked

D. Placing and Bonding:
   1. Lay solid masonry units in full bed of mortar, with full head joints.
   2. Lay hollow masonry units with face shell bedding on head and bed joints.
   3. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
   4. Remove excess mortar as work progresses.
   5. Interlock intersections and external corners
   6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
   7. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
   8. Isolate masonry from vertical structural framing members with movement joint as indicated on Drawings.
   9. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler as indicated on Drawings.

E. Weeps and Vents: Furnish weeps and vents in outer wythe at 32 inches o.c. horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

F. Joint Reinforcement And Anchorage - Masonry Veneer:
   1. Secure wall ties or strap anchors to stud framed backing and embed into masonry veneer at maximum16 inches oc vertically and 32 inches oc horizontally.
   2. Place wall ties at maximum 3 inches oc vertically within 12 inches of jamb of wall openings
   3. Place wall ties at maximum 3 inches on center horizontally within 12 inches of head and sill of wall openings
   4. Reinforce joint corners and intersections with strap anchors 16 inches oc

G. Masonry Flashings:

1. Extend flashings horizontally through outer wythe at foundation walls, above ledge or shelf angles and lintels, under parapet caps, at bottom of walls, and turn down on outside face to form drip.
2. Turn flashing up minimum 8 inches and bed into mortar joint of masonry or seal to concrete or seal to sheathing over steel stud backing.
3. Lap end joints minimum 6 inches and seal watertight
4. Turn flashing, fold, and seal at corners, bends, and interruptions.

H. Lintels:
1. Install loose steel lintels over openings.
2. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled or indicated.
3. Do not splice reinforcing bars.
4. Support and secure reinforcing bars from displacement
5. Place and consolidate grout fill without displacing reinforcing.
6. Allow masonry lintels to attain specified strength before removing temporary supports.
7. Maintain minimum bearing on each side of opening.
   a. Steel: 4 inches

I. Grouted Components:
1. Reinforce bond beam as shown on drawings.
2. Lap splices bar diameters required by code.
3. Support and secure reinforcing bars from displacement
4. Place and consolidate grout fill without displacing reinforcing.
5. At bearing locations, fill masonry cores with grout for minimum 8 inches both sides of opening

J. Control And Expansion Joints:
1. Install control and expansion joints at the following maximum spacings, unless otherwise indicated on Drawings:
   a. Exterior Walls: 20 feet on center and within 24 inches on one side of each interior and exterior corner
   b. At changes in wall height
2. Locate expansion joints in brick at returns, building corners, and at 30 feet maximum spacing.
3. Do not continue horizontal joint reinforcement through control and expansion joints.
4. Install preformed control joint device in continuous lengths .
   a. Seal butt and corner joints
5. Size control joint in accordance with Section 07 90 00 for sealant performance
6. Form expansion joint by omitting mortar and cutting unit to form open space.

K. Cutting And Fitting:
1. Cut and fit for chases, pipes, conduit, sleeves, and grounds.
   a. Coordinate with other sections of work to provide correct size, shape, and location.
2. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

B. Maximum Variation from Alignment of Columns or Pilasters: 1/4 inch

C. Maximum Variation from Unit to Adjacent Unit: 1/16 inch

D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more

E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more

F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft

G. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft

H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch

I. Maximum Variation for Steel Reinforcement:
   1. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls
   2. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less
   3. Plus or minus 1 inch when distance is between 8 and 24 inches
   4. Plus or minus 1-1/4 inch when distance is greater than 24 inches
   5. Plus or minus 2 inches from location along face of wall

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Brick Units: Test each type in accordance with ASTM C67, 5 random units for each 50,000 units installed.

3.6 CLEANING

A. Section 01 77 00 – Closeout Procedures: Final cleaning

B. Remove excess mortar and mortar smears as work progresses.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.

3.7 PROTECTION OF FINISHED WORK

A. Section 01 73 00 - Execution: Requirements for protecting finished Work.

B. Protect exposed external corners subject to damage.

C. Protect base of walls from mud and mortar splatter

D. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.

E. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry.
   1. Provide coverings where masonry is exposed to weather when work is not in progress.

END OF SECTION

DIVISION 05 METALS

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Structural shapes
2. Channels and angles
3. Hollow structural sections
4. Structural pipe
5. Structural plates and bar
6. Bolts, connectors, and anchors

B. Related Requirements:
1. Section 03 60 00 - Grouting: Grout for setting base plates
2. Section 05 21 00 - Steel Joist Framing
3. Section 05 31 23 - Steel Roof Decking: Support framing for small openings in roof deck
4. Section 05 50 00 - Metal Fabrications: Steel fabrications affecting structural steel work

1.2 REFERENCE STANDARDS

A. American Institute of Steel Construction:
1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges
2. AISC 341 - Seismic Provisions for Structural Steel Buildings
3. AISC 360 - Specification for Structural Steel Buildings

B. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination
2. AWS D1.1 - Structural Welding Code - Steel

C. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
4. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
5. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts
6. ASTM A992/A992M - Standard Specification for Structural Steel Shapes
7. ASTM F436 - Standard Specification for Hardened Steel Washers
8. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

D. Green Seal:
1. GC-03 - 2nd Edition, January 1997 - Anti-Corrosive Paints.

E. Research Council on Structural Connections:
   1. RCSC - Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts

F. SSPC: The Society for Protective Coatings:
   1. SSPC - Steel Structures Painting Manual
   2. SSPC Paint 15 - Steel Joist Shop Paint
   3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic)
   4. SSPC SP 3 - Power Tool Cleaning
   5. SSPC SP 6 - Commercial Blast Cleaning

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination

B. Coordinate work with the following:
   1. Section 05 21 00, and 05 31 23 for framed openings other than structural steel
   2. Section 05 50 00 for miscellaneous steel supports other than structural steel

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Shop Drawings:
   1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and bolts
   2. Connections and Connections not detailed
   3. Cambers and loads
   4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths

C. Manufacturer's Mill Certificate: Certify products meet or exceed specified requirements

D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
   1. Structural Steel: Applicable AISC Specifications
   2. Architecturally Exposed Structural Steel: AISC 303, Section 10
   3. High Strength Bolted Connections: RCSC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts

1.6 QUALIFICATIONS

A. Fabricator: Company specializing in performing Work of this section with minimum ten years documented experience

B. Erector: Company specializing in performing Work of this section with minimum ten years documented experience

C. Shop Painter: Company specializing in performing Work of this section with minimum ten years documented experience

D. Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural W-Shapes: ASTM A992

B. Structural M-Shapes: ASTM A36

C. Structural S-Shapes: ASTM A36

D. Structural T-Shapes: Cut from structural W-shapes

E. Channels and Angles: ASTM A36/A36M

F. Round Hollow Structural Sections: ASTM A500, Grade B

G. Rectangular Hollow Structural Sections: ASTM A500/A500M, Grade B

H. Structural Pipe: ASTM A53/A53M, Grade B

I. Structural Plates and Bars: ASTM A36 unless noted otherwise

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. Bolts: Heavy hex, structural type
   1. ASTM A325; Type 1, plain

B. Nuts: ASTM A563 Grade A; heavy hex type
   1. Finish: Plain

C. Washers: ASTM F436; Type 1, circular beveled
   1. Finish: Plain

D. Threaded Rods: ASTM A36
   1. Finish: Unfinished

E. Forged Structural Steel Hardware:
   1. Clevises and Turnbuckles: ASTM A108; Grade 1085
   2. Eye Nuts and Eye Bolts: ASTM A108; Grade 1030
   3. Sleeve Nuts: ASTM A108; Grade 1018
   4. Rod Ends, Yoke Ends and Pins, Cotter Pins, and Coupling Nuts: Carbon steel

2.3 WELDING MATERIALS

A. Welding Materials: AWS D1.1; type required for materials being welded

2.4 FABRICATION

A. Continuously seal joined members by continuous welds
   1. Grind exposed welds smooth

B. Fabricate connections for bolt, nut, and washer connectors

C. Develop required camber for members

2.5 FINISHES

A. Prepare structural component surfaces in accordance with SSPC SP 3

B. Shop prime structural steel members
   1. Do not prime surfaces that will be field welded, in contact with concrete, or high strength bolted

C. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication

D. Galvanizing for Bolts, Connectors, and Anchors:
   1. Hot-Dipped Galvanizing:
      a. Bolts, Nuts, and Washers: ASTM F2329
      b. Connectors and Anchors: ASTM A153/A153M
   2. Mechanical Galvanizing: ASTM B695; Class 50 minimum

2.6 ACCESSORIES

A. Grout: Non-shrink type as specified in Section 03 60 00

B. Shop Primer: SSPC Paint 15, Type 1, red oxide

C. Touch-Up Primer: Match shop primer

D. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic or Type II Organic

2.7 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements

B. Shop test bolted and welded connections as specified for field quality control tests

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Requirements for installation examination

B. Verify bearing surfaces are at correct elevation

C. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment

3.2 PREPARATION

A. Section 01 73 00 - Execution.

B. Furnish templates for installation of anchor rods and embedments in concrete and masonry work

3.3 ERECTION

A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing

B. Field weld components and shear connectors indicated on Drawings

C. Field connect members with threaded fasteners; torque to required resistance

D. Do not field cut or alter structural members without approval of Architect/Engineer

E. After erection, touch up welds and abrasions to match shop finishes

3.4 GROUT INSTALLATION

A. Shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts

B. Fill void under bearing surface with grout. Install and pack grout to remove air pockets

C. Moist cure grout

D. Remove forms after grout is set. Trim grout edges to from smooth surface, splayed 45 degrees

E. Tighten anchor bolts after grout has cured for a minimum of 3 days

3.5 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

B. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative

C. Maximum Offset From Alignment: 1/4 inch

3.6 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing

B. Bolted Connections: Inspect in accordance with AISC 303
   1. Visually inspect all bolted connections
   2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2

C. Welding: Inspect welds in accordance with AWS D1.1
   1. Certify welders and conduct inspections and tests as required
      a. Record types and locations of defects found in work
      b. Record work required and performed to correct deficiencies
   2. Visually inspect all welds

D. Correct defective bolted connections and welds

END OF SECTION

SECTION 05 31 23

STEEL ROOF DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Steel roof deck and accessories
2. Framing for openings up to and including 18 inches
3. Bearing plates and angles

B. Related Sections:
1. Section 05 12 00 - Structural Steel Framing: Support framing for deck openings
2. Section 13 34 19 – Metal Building Systems

1.2 REFERENCES

A. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel
2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
3. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable

B. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel

C. Green Seal:
1. GC-03 - 2nd Edition, January 7, 1997 - Anti-Corrosive Paints.

D. FM Global:
1. FM DS 1-28 - Wind Loads to Roof Systems and Roof Deck Securement.
2. FM 4450 - Approval Standard for Class 1 Insulated Steel Deck Roofs
3. FM 4451 - .Profiled Steel Panels for Use as Decking in Class 1 Insulated Roof Construction

E. Steel Deck Institute:
1. SDI 29 - Design Manual for Composite Decks, Form Decks and Roof Decks

F. SSPC: The Society for Protective Coatings:
1. SSPC Paint 15 - Steel Joist Shop Paint

1.3 PERFORMANCE REQUIREMENTS

A. Design metal deck in accordance with SDI 29 Design Manual

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements

B. Shop Drawings: Indicate deck plan, support locations, projections, openings and reinforcement, pertinent details, and accessories

C. Product Data: Submit deck profile characteristics and dimensions, structural properties, and finishes

D. Manufacturer's Certificates: Certify Products meet or exceed specified requirements

1.5 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum ten years documented experience

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements

B. Cut plastic wrap to encourage ventilation

C. Separate sheets and store deck on dry wood sleepers; slope for positive drainage

PART 2 - PRODUCTS

2.1 STEEL ROOF DECKING

A. Manufacturers:
1. ASC Profiles, Inc;
2. Cordeck
3. Epic Metals Corporation
4. New Millennium Building Systems, LLC
5. Verco Decking, Inc., a Nucor company
6. Vulcraft; Nucor Vulcraft Group
7. Substitutions: Section 01 60 00 - Product Requirements

B. Sheet Steel: ASTM A653, Grade 33 Structural Quality; with G90 galvanized coating

C. Bearing Plates and Angles: ASTM A36/A36M steel, unfinished

D. Welding Materials: AWS D1.1

E. Shop Primer: Manufacturer standard

F. Touch-Up Primer: Match shop primer

2.2 ACCESSORIES

A. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to deck

B. Sump Pans, Sump Plates, Valley Strips, Eave Strips: Fabricated of metal of same type and finish as deck

2.3 FABRICATION

A. Metal Deck: Sheet steel, configured as follows:
1. Span Design: indicated on structural drawing
2. Minimum Metal Thickness Excluding Finish: As shown on structural drawings
3. Minimum Section Properties (per foot width): indicated on structural drawings
4. Minimum Allowable Diaphragm Shear: as indicated in structural drawings
5. Nominal Height: As indicated on structural drawings
6. Sheet Width: As indicated on structural drawings
7. Side Joints: lock seam

8. Flute Sides: plain vertical face

B. Related Deck Accessories: Metal closure strips, cover plates, 20 gage thick sheet steel; of profile and size as indicated on drawings

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Manual

B. Bear deck on masonry or concrete support surfaces with 4 inch minimum bearing
1. Align and level

C. Bear deck on steel supports with 2 inch minimum bearing
1. Align and level

D. Fasten ribbed deck to steel support members at ends and intermediate as indicated in structural drawings

E. Weld in accordance with AWS D1.1

F. Weld male/female side laps at 12 inches oc maximum

G. Seal deck joints, laps, ends, and penetrations with sealant to achieve permanent air seal

H. Reinforce steel deck openings from 6 to 12 inches in size as indicated in structural drawings

I. Install 6 inch minimum wide sheet steel cover plates, of same thickness as deck, where deck changes direction
1. Fusion weld 12 inches oc maximum

J. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings

K. Install double row of foam flute closures above walls and partitions perpendicular to deck flutes

L. Position roof sump pans with flange bearing on top surface of deck
1. Fusion weld at each deck flute

M. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint

3.3 FIELD QUALITY CONTROL

A. Welding: Inspect welds in accordance with AWS D1.1

END OF SECTION

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Load bearing formed steel stud exterior wall framing
2. Formed steel framing
3. Bridging

B. Related Sections:
1. Section 05 12 00 - Structural Steel Framing: Structural building framing
2. Section 05 31 23 - Steel Roof Decking: Metal roof decking supported by wall stud metal framing
3. Section 06 10 53 - Miscellaneous Rough Carpentry: Rough wood blocking
4. Section 07 21 16 - Blanket Insulation: Insulation within framing members
5. Section 09 22 16 - Non-Structural Metal Framing

1.2 REFERENCES

A. American Iron and Steel Institute:
1. AISI General - Standard for Cold-Formed Steel Framing - General Provisions
2. AISI Header - Standard for Cold-Formed Steel Framing - Header Design
3. AISI NAS - North American Specification for Design of Cold-Formed Steel Structural Members

B. ASTM International:
1. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members
2. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

C. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel
2. AWS D1.3 - Structural Welding Code - Sheet Steel
3. GC-03-2nd Edition, January 7, 1997 - Anti-Corrosive Paints

D. California Department of Health:
1. GC-03 - 2nd Edition, January 7, 1997 - Anti-Corrosive Paints.

E. National Association of Architectural Metal Manufacturers:
1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual

F. SSPC: The Society for Protective Coatings:
1. SSPC Paint 15 - Steel Joist Shop Paint
2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic)

G. Steel Stud Manufacturers Association:
1. SSMA - Product Technical Information

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements

B. Shop Drawings:
1. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work
2. Indicate stud and layout
3. Describe method for securing studs to tracks and for bolted and welded framing connections
4. Submit calculations for loadings and stresses of specially fabricated framing under Professional engineer's seal

C. Submit product data:
1. Standard framing members
a. Materials and finish
b. Product criteria
c. Limitations

1.4 QUALITY ASSURANCE

A. Calculate structural properties of framing members in accordance with AISI NAS

B. Furnish framing materials in accordance with SSMA - Product Technical Information

C. Perform Work in accordance with the following:
1. Framing: AISI General and AISI NAS
2. Headers: AISI Header
3. Wall Studs: AISI WSD
4. Lateral Design: AISI Lateral

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience
1. Current member of Steel Stud Manufacturers Association

B. Installer: Company specializing in performing Work of this section with minimum five years documented experience

C. Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location

D. Form, fabricate, provide, and connect components in accordance with NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual

1.6 COORDINATION

A. Section 01 31 00 – Project Management and Coordination

B. Coordinate placement of components within stud framing system specified in other sections

PART 2 - PRODUCTS

2.1 COLD-FORMED METAL FRAMING

A. Manufacturers
1. ClarkDietrich Building Systems

2. SCAFCO Corporation
3. Steeler, Inc
4. Substitutions: Section 01 60 00 - Product Requirements

2.2 FRAMING COMPONENTS

A. Manufactured from prime mill certified steel; re-rolled steel without mil certificate not acceptable
   1. Steel Sheet: ASTM A1003/A1003M; Structural Grade, Type H, metallic coated:
      a. Coating: G60

B. Cold-Formed Structural Studs: Galvanized steel C-studs complying with ASTM C955
   1. Flange length: 1-5/8 inches. As indicated on Drawings
   2. Web depth: 3-1/2, 3-5/8, 6, and 8 inches as indicated on Drawings
   3. Minimum material thickness: 16 and 14 gage as indicated on drawings
   4. Minimum yield strength: 33 KSI as required by design
   5. Stud Punch-outs: Minimum 10 inches between end of member and near edge of web punch-out and 24 inches on center thereafter, per ASTM C955

C. Structural Track: Cold-formed galvanized steel runner tracks complying with ASTM C955.
   1. Flange length: 1-1/2 inches as indicated on Drawings
   2. Web: Track web size to match stud web size
   3. Minimum material thickness: To match wall stud thickness
   4. Minimum yield strength: 33 KSI as required by design

D. Standard Clip Angles:
   1. Minimum thickness: 16 and 14 gage as indicated on drawings
   2. Minimum yield strength: 50 KSI

E. U-Channel (CRC Cold Rolled Channel):
   1. Thickness: as indicated on drawings
   2. Size: As required by design

F. Girts: Steel sheet formed to channel cee and zee shape, solid web
   1. Thickness: as indicated on drawings
   2. Size: As shown on drawings

2.3 ACCESSORIES

A. Framing Accessories: As required for project, complying with ASTM C955
   1. Flat strapping for X-bracing
   2. Flat strapping and bridging for lateral bracing
   3. Gusset plates
   4. Flat steel sheets

B. Shop Primer: SSPC Paint 15, Type 1, red oxide

C. Touch-Up Primer: Match shop primer

D. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20, Type I Inorganic or Type II Organic

2.4 FASTENERS

A. Fasteners: Self-drilling, self-tapping screws complying with ASTM C1513, hot dip galvanized

B. Anchorage Devices: as detail on the drawings

C. Welding: In conformance with AWS D1.1 and AWS D1.3

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Verify substrate surfaces and building framing components are ready to receive Work

C. Verify rough-in utilities are in proper location

3.2 ERECTION OF STUDS

A. Align floor and ceiling tracks; locate to wall and partition layout
   1. Secure in place with fasteners at maximum 24 inches oc

B. Place studs at 16 inches oc; not more than 2 inches from abutting walls and at each side of openings
   1. Connect studs to tracks using fastener method

C. Construct corners using minimum three studs
   1. Double stud wall openings, door jambs, and window jambs

D. Erect load bearing studs one piece full length
   1. Splicing of studs is not permitted

E. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements

F. Fully seat axial loaded studs in receiving tracks (maximum 1/16 inch gap between stud and track web)

G. Coordinate placement of insulation in multiple stud spaces after erection

H. Install intermediate studs above and below openings to align with wall stud spacing

I. Install studs with deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing

J. Attach cross studs to studs for attachment of fixtures anchored to walls

K. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation

L. Touch-up field welds and damaged metallic coatings and primed surfaces with primer to match shop coating

M. Complete framing ready to receive finishes

3.3 ERECTION OF GIRTS

A. Install framing components.

B. Make provisions for erection stresses
   1. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed

C. Place grits as indicated on Drawings; not more than 2 inches from abutting walls
   1. Connect joists to supports using fastener method

D. Locate joist end bearing directly over load bearing studs or install load distributing member to top of stud track

E. Install web stiffeners as required by design

F. Touch-up field welds and damaged metallic coatings and primed surfaces with primer to match shop coating

G. Complete framing ready to receive finishes

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

B. Maximum Variation from Indicated Position: 1/4 inch

C. Maximum Variation of Members from Plane: 1/4 inch

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Shop-fabricated metal items
2. Loose steel lintels
3. Channel door frames
4. Bollards
5. Ladders
6. Miscellaneous structural steel supports
7. Fabricated architectural details
8. Anchor bolts

B. Related Requirements:
1. Section 03 30 00 - Cast-in-Place Concrete: Execution requirements for embedded anchors and attachments for metal fabrications specified by this Section in concrete
2. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts
3. Section 05 31 23 - Steel Roof Decking: Bearing plates and angles for metal deck bearing, including anchorage
4. Section 05 52 00 - Metal Railings: Requirements for aluminum or steel, pipe or tube railing systems
5. Section 09 90 00 - Painting and Coating: Field applied paint finish

1.2 REFERENCE STANDARDS

A. American National Standards Institute:
1. ANSI A14.3 - Ladders - Fixed - Safety Requirements

B. ASTM International:
1. ASTM A36 - Standard Specification for Carbon Structural Steel
2. ASTM A53- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
4. ASTM A312 - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
5. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
6. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
7. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts
8. ASTM F436 - Standard Specification for Hardened Steel Washers
9. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength

C. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination
2. AWS D1.1 - Structural Welding Code - Steel

3. AWS D1.6 - Structural Welding Code - Stainless Steel

D. Green Seal:
1. GC-03 - 2nd Edition, January 7, 1997 - Anti-Corrosive Paints.

E. National Ornamental & Miscellaneous Metals Association:
1. NOMMA Guideline 1 - Joint Finishes.

F. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Shop Drawings:
1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories
2. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.4 welding symbols
3. Indicate net weld lengths

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Inspection:
1. Accept metal fabrications on-Site in labeled shipments
2. Inspect for damage

C. Protect metal fabrications from damage by exposure to weather or by ground contact

1.5 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings

PART 2 - PRODUCTS

2.1 LINTELS

A. Steel sections, size and configuration as indicated on Drawings, length to allow 8 in minimum bearing on both sides of opening
1. Exterior Locations: Prime paint, one coat
2. Interior Locations: Prime paint, one coat

2.2 DOOR FRAMES

A. Door Frames: Steel channel sections, size indicated on Drawings, with jamb anchors suitable for building into masonry, attachment to concrete, and, minimum 4 anchors per jamb; prime paint, one coat

2.3 BOLLARDS

A. Bollards: Steel pipe, concrete filled, crowned cap, 6 in diameter, length as indicated on Drawings; prime paint, one coat

B. Concrete Fill: 3,000 psi as specified in Section 03 30 00 - Cast-in-Place Concrete

C. Anchors: Concealed type as indicated on Drawings

2.4 LADDERS

A. Ladder: ANSI A14.3, steel-welded construction.
1. Side Rails: 1/2 x 2 inch side rails spaced at 24 inches apart.
2. Rungs: 1 in diameter solid rod, spaced 12 in o.c.
3. Mounting: Space rungs 7 in from wall surface; with steel mounting brackets and attachments
4. Finish: Prime paint, one coat

2.5 MISCELLANEOUS STRUCTURAL STEEL SUPPORTS

A. Other Structural Supports: Steel sections, shape and size as indicated on Drawings required to support applied loads with maximum deflection of 1/240 of the span; prime paint, one coat

2.6 FABRICATED ARCHITECTURAL TRIM

A. Steel sections, size and configuration as indicated on Drawings

B. Exterior Locations: Prime paint, one coat

2.7 COLD ROLLED STEEL SHEET

A. Locations:
1. Wall Panels
2. Ceiling Panels
3. Steel Counter Tops as called out on the drawings.
4. Bench Surfaces where called out on drawings.

B. Manufacturer
1. Delform Metal Fabrications
2. Winnick Supply
3. Metals Depot

C. Size: 4’-0” X 8’-0” sheet

D. Guage: 10 GA

E. Finish: Clear Satin Lacquer

2.8 STL-1 Hot-Rolled Sheet Steel Panel (raw stock):

A. 16 Gauge

B. Trim, Closure Pieces, Caps, Flashings: Same material, thickness and finish as exterior sheets; brake formed to required profiles; as shown on Architectural Details.

C. Fasteners: Standard stainless steel to suit application

D. Sealants: Joint Sealants per specification section 07 90 00 Joint Protection

E. Finishing: Field cleaned and then sprayed with linseed oil and back brushed.

2.9 Fabrication:

A. Form sections to shape indicated on Architectural Drawings, accurate in size, square, and

free from distortion or defects.

B. Form pieces in longest practicable lengths.

C.

2.10 ANCHORS

A. Anchor Rods: ASTM A307; Grade A
   1. Shape: Hooked and Straight
   2. Furnish with nut and washer; unfinished

B. Epoxy Adhesive Anchors:
   1. Manufacturer List:
      a. Cobra Anchors
      b. Hilti, Inc
      c. Simpson Strong-Tie Co., Inc
      d. Substitutions: Section 01 60 00 - Product Requirements

C. Grout: According to Section 03 60 00 - Grouting

D. Threaded Rod: As shown on the drawings or as approved by Architect

2.11 MATERIALS

A. Steel:
   1. Structural W-Shapes: ASTM A992
   2. Structural Shapes: ASTM A36
   3. Channels and Angles: ASTM A36
   4. Steel Plate: ASTM A36
   5. Hollow Structural Sections: ASTM A500, Grade B
   6. Steel Pipe: ASTM A53, Grade B, Schedule 40
   7. Sheet Steel: ASTM A653, Grade 33 Structural Quality
   8. Bolts: ASTM A325; Type 1
   9. Nuts: ASTM A563 heavy hex type
   10. Washers: ASTM F436; Type 1
   11. Welding Materials: AWS D1.1; type required for materials being welded

B. Stainless Steel:
   1. Bars and Shapes: ASTM A276; Type 304
   2. Tubing: ASTM A554; Type 304
   3. Pipe: ASTM A312 seamless; Type 304
   4. Plate, Sheet, and Strip: ASTM A240; Type 304
   5. Bolts, Nuts, and Washers: ASTM A354
   6. Welding Materials: AWS D1.6; type required for materials being welded

C. Aluminum:
   1. Extruded Aluminum: ASTM B221 Alloy 6063, Temper T6
   2. Sheet Aluminum: ASTM B209 Alloy, Temper T5
   3. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 Alloy 6063, Temper T6
   4. Aluminum-Alloy Bars: ASTM B211 Alloy 6063, Temper T6
   5. Bolts, Nuts, and Washers: Stainless steel
   6. Welding Materials: AWS D1.1; type required for materials being welded

D. Bolts, Nuts, and Washers for Equipment and Piping:
   1. Carbon Steel:
      a. Structural Connections: ASTM A307, Grade A or B, hot-dip galvanized

b. Anchor Bolts: ASTM A307, Grade B, ASTM A36, hot-dip galvanized
c. Pipe and Equipment Flange Bolts: ASTM A193, Grade B-7

2.12 FABRICATION

A. Fit and shop assemble items in largest practical sections for delivery to Site

B. Fabricate items with joints tightly fitted and secured

C. Continuously seal joined members by continuous welds

D. Grind exposed joints flush and smooth with adjacent finish surface
1. Make exposed joints butt tight, flush, and hairline
2. Ease exposed edges to small, uniform radius

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise

G. Fabrication Tolerances:
1. Squareness: 1/8 in maximum difference in diagonal measurements
2. Maximum Offset between Faces: 1/16 in
3. Maximum Misalignment of Adjacent Members: 1/16 in
4. Maximum Bow: 1/8 inch in 48 in
5. Maximum Deviation from Plane: 1/16 inch in 48 in

2.13 FINISHES

A. Steel:
1. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing
2. Do not prime surfaces in direct contact with concrete or where field welding is required
3. Prime paint items with two coats except where galvanizing is specified
4. Galvanizing: ASTM A123; hot-dip galvanize after fabrication
5. Galvanizing for Fasteners, Connectors, and Anchors:
a. Hot-Dip Galvanizing: ASTM A153
b. Mechanical Galvanizing: ASTM B695; Class 50 minimum
6. Sheet Steel: Galvanized with G90 coating class
7. Bolts: Unfinished
8. Nuts: Unfinished
9. Washers: Unfinished
10. Shop Primer: SSPC Paint 15, Type 1, red oxide
11. Touch-Up Primer: Match shop primer
12. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I or Inorganic SSPC Paint 20 Type II Organic

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Requirements for installation examination.

B. Verify field conditions are acceptable and are ready to receive Work

3.2 PREPARATION

A. Section 01 73 00 - Execution: Requirements for installation preparation

B. Clean and strip primed steel items to bare metal where Site welding is required

C. Do not embed aluminum products into cementitious materials

D. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, and free from distortion or defects

B. Make provisions for erection stresses
   1. Install temporary bracing to maintain alignment until permanent bracing and attachments are installed

C. Field weld components indicated on Drawings

D. Perform field welding according to AWS D1.1

E. Obtain approval of Architect prior to Site cutting or making adjustments not scheduled

3.4 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Requirements for tolerances

B. Maximum Variation from Plumb: 1/4 in per story or for every 12 ft in height, whichever is greater, non-cumulative

C. Maximum Variation from Level: 1/16 inch in 3 ft and 1/4 inch in 10 ft

D. Maximum Offset from Alignment: 1/4 in

E. Maximum Out-of-Position: 1/4 in

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing

B. Welding: Inspect welds according to AWS D1.1

C. Replace damaged or improperly functioning hardware

D. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes

E. Touch up factory-applied finishes according to manufacturer-recommended procedures

3.6 ADJUSTING

A. Section 01 77 00 – Closeout Procedures

B. Adjust operating hardware and lubricate as necessary for smooth operation

END OF SECTION

SECTION 05 52 00

METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Steel pipe railings, guard rails, balusters, and fittings

B. Related Requirements:
1. Section 05 50 00 - Metal Fabrication: Attachment plates, angles, and anchorage
2. Section 09 90 00 - Painting and Coating: Paint finish

1.2 REFERENCE STANDARDS

A. ASTM International:
1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
3. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
4. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
5. ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
6. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings

B. Green Seal:
1. GC-03 - Anti-Corrosive Paints.

C. National Association of Architectural Metal Manufacturers:
1. NAAMM Metal Finishes Manual

D. National Ornamental & Miscellaneous Metals Association:
1. NOMMA Guideline 1 - Joint Finishes

E. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual
2. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer
3. SSPC Paint 20 - Zinc-Rich Coating, Type I - Inorganic and Type II - Organic

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories

1.4 QUALITY ASSURANCE

A. Perform Work of this Section according to ASTM E985

B. Finish joints according to NOMMA Guideline 1

1.5 QUALIFICATIONS

A. Fabricator: Company specializing in fabricating products specified in this Section with minimum five years' documented experience

B. Erector: Company specializing in performing Work of this Section with minimum five years' documented experience

1.6 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication
   1. Indicate field measurements on Shop Drawings

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Handrail, guardrail, and attachments to resist forces as required by applicable code. Apply loads non-simultaneously to produce maximum stresses
   1. Guard Top Rail and Handrail Concentrated Load: 200 lb. applied at any point in any direction
   2. Guard Top Rail Uniform Load: 50 plf applied in any direction
   3. Intermediate Rails, Panels, and Baluster Concentrated Load: 50 lb. applied to 1 sq. ft. area

2.2 MATERIALS

A. Steel Railing System:
   1. Tubing: ASTM A513, Type 5, minimum 50 ksi yield strength
   2. Hollow Structural Sections: ASTM A500, Grade B
   3. Pipe: ASTM A53, Grade B, Schedule 40
   4. Rails and Posts: 1 1/2-inch-diameter steel pipe; welded joints
   5. Posts: 1 1/2-inch-diameter steel pipe; welded joints
   6. Splice Connectors: Steel concealed spigots
   7. Shop Primer: SSPC Paint 15, Type 1, red oxide
   8. Touchup Primer: Match shop primer

2.3 FABRICATION

A. Fit and shop-assemble components in largest practical sizes for delivery to Site

B. Fabricate components with joints tightly fitted and secured
   1. Furnish spigots and sleeves to accommodate Site assembly and installation

C. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe

D. Supply components required for anchorage of fabrications
   1. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise

E. Interior Components: Continuously seal joined pieces by continuous welds

F. Grind exposed joints flush and smooth with adjacent finish surface
   1. Make exposed joints butt tight, flush, and hairline
   2. Ease exposed edges to small uniform radius

G. Accommodate expansion and contraction of members and building movement without damage to connections or members

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Requirements for installation examination

B. Verify that field conditions are acceptable and are ready to receive Work

C. Verify that concealed blocking and reinforcement are installed and correctly located to receive wall-mounted handrails

3.2 PREPARATION

A. Section 01 73 00 - Execution: Requirements for installation preparation

B. Clean and strip primed steel items to bare metal where Site welding is required

C. Supply items required to be placed in partitions with setting templates to appropriate Sections

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Anchor railings to structure with as indicated on Drawings

C. Field-weld anchors as indicated on Drawings
   1. Touch up welds with primer
   2. Grind welds smooth

D. Conceal bolts and screws whenever possible
   1. Where not concealed, use flush countersunk fastenings

E. Assemble with spigots and sleeves to accommodate tight joints and secure installation

3.4 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Requirements for tolerances

B. Maximum Variation from Plumb: 1/4 inch per story, noncumulative

C. Maximum Offset from Alignment: 1/4 inch

D. Maximum Out-of-Position: 1/4 inch

END OF DIVISION

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes roof curbs, and perimeter nailers; blocking in wall and roof openings; wood furring and grounds; wall cabinets, wood trim; telephone and electrical panel back boards; and concealed wood blocking for support.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. American Wood-Preservers' Association:
1. AWPA M4 - Standard for the Care of Preservative-Treated Wood Products.

C. ASTM International:
1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

D. Forest Stewardship Council:
1. FSC Guidelines - Forest Stewardship Council Guidelines.

E. The Redwood Inspection Service:
1. RIS - Standard Specifications for Grades of California Redwood Lumber.

F. Southern Pine Inspection Bureau:
1. SPIB - Standard Grading Rules for Southern Pine Lumber.

G. U.S. Department of Commerce National Institute of Standards and Technology:
1. DOC PS 1 - Construction and Industrial Plywood.
2. DOC PS 20 - American Softwood Lumber Standard.

H. West Coast Lumber Inspection Bureau:
1. WCLIB - Standard Grading Rules for West Coast Lumber.

I. Western Wood Products Association:
1. WWPA G-5 - Western Lumber Grading Rules.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
1. Lumber Grading Agency: Certified by DOC PS 20.
2. Lumber: DOC PS 20.

PART 2 PRODUCTS

2.1 MATERIALS

A. Lumber Grading Rules: NLGA RIS SPIB WCLIB WWPA or NELMA.

B. Miscellaneous Framing: Douglas Fir - Larch grade, No 2 or better, 19 percent maximum moisture content.

C. Plywood: EWA Rated Sheathing; Plywood Oriented Strand Board Span Rating as noted on structural drawings; Exposure Durability 1 exterior; unsanded.

D. Particleboard: ANSI A208.1 Waferboard Structural Particleboard; wood chips shavings flakes set with waterproof resin binder; grade as noted on structural drawings; unsanded faces.

2.2 ACCESSORIES

A. Fasteners and Anchors:
1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
2. Nails and Staples: ASTM F1667.
3. Drywall Screws: Bugle head, hardened steel, power driven type, length to achieve full penetration of sheathing substrate.
4. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

2.3 FACTORY WOOD TREATMENT

A. Wood Preservative (Pressure Treatment): AWPA U1, Commodity Specification A-Sawn Products or F-Wood Composites using water-borne preservative.

B. Wood Preservative (Surface Application): Clear , Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E 84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period, Interior Type.

C. Moisture Content after Treatment: Kiln dried (KDAT).
1. Lumber: Maximum 19 percent.
2. Structural Panels: Maximum 15 percent.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify substrate conditions are ready to receive blocking, curbing and framing.

3.2 PREPARATION

A. Coordinate placement of blocking, curbing and framing items.

3.3 INSTALLATION

A. Set members level and plumb, in correct position.

B. Place horizontal members, crown side up.

C. Construct curb members of solid wood sections.

D. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

E. Coordinate curb installation with installation of decking and support of deck openings, and roofing vapor retardant.

F. Space framing and furring 16 inches oc.

G. Secure sheathing to framing members with ends over firm bearing and staggered.

H. Install telephone and electrical panel back boards with plywood sheathing material where required. Size back boards 12 inches beyond size of electrical and telephone panel.

END OF SECTION

SECTION 06 16 00

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Parapet sheathing.
3. Sheathing joint and penetration treatment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WALL SHEATHING

A. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corporation: Saint-Gobain North America.
   b. Continental Building Products, LLC.
   c. Georgia-Pacific Gypsum Company.
   d. National Gypsum Company.
   e. USG Corporation.
2. Type and Thickness: Type X, 5/8 inch thick.

2.3 PARAPET SHEATHING

A. Glass-Mat Gypsum Sheathing, Parapets: ASTM C1177/C1177M.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation: Saint-Gobain North America.
b. Georgia-Pacific Gypsum Company.
c. National Gypsum Company.
d. USG Corporation.

2. Type and Thickness: Type X, 5/8 inch thick.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M of Type 304 stainless steel.

2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 07 92 00 "Joint Sealants."

B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.

D. Coordinate wall and parapet sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Seal sheathing joints in accordance with sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Interior Finish Carpentry:
a. Standing and running trim
b. Pre-finish the Work of this Section
2. Interior Finished Plywood Wall Panels

B. Related Requirements:
1. Section 06 41 00 - Architectural Woodwork: Shop-fabricated custom cabinetwork and interior finish carpentry
2. Section 08 14 16 - Flush Wood Doors
3. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items

1.2 REFERENCE STANDARDS

A. American National Standards Institute:
1. ANSI A135.4 - Basic Hardboard
2. ANSI A208.1 - Mat-Formed Wood Particleboard

B. APA-The Engineered Wood Association:
1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood

C. Architectural Woodwork Institute, Woodwork Institute, and Architectural Woodwork Manufacturers Association of Canada:
1. AWS - Architectural Woodwork Standards
2. Supplemented with The WI Approach

D. ASTM International:

1. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
2. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
4. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples

E. Hardwood Plywood and Veneer Association:
1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood

F. National Electrical Manufacturers Association:
1. NEMA LD 3 - High Pressure Decorative Laminates.
2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

G. Redwood Inspection Service:
1. RIS - Redwood Lumber Grades and Use

H. U.S. Department of Commerce National Institute of Standards and Technology:
   1. DOC PS 20 - American Softwood Lumber Standard

I. Western Red Cedar Association:
   1. WRCA - Lumber Grades and Standards

J. Western Wood Products Association:
   1. WWPA - Lumber Grades and Standards

1.3 COORDINATION

A. Section 01 31 00 – Project Management and Coordination

B. Coordinate Work of this Section with electrical rough in and installation of associated and adjacent components

1.4 SEQUENCING

A. Section 01 10 00 - Summary: Requirements for Work sequencing

B. Sequence Work to ensure utility connections are achieved in orderly and expeditious manner

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Samples:
   1. Submit two samples of finish plywood, 8 x 10 inches in size, illustrating wood grain and specified finish
   2. Submit two samples of wood trim 10 in long.
   3. Submit two samples of synthetic lumber and shop finishes
   4. Submit two 12inch by 12inch samples of plywood panels with sealer for approval prior to installation

C. Qualification Statements:
   1. Submit manufacturer and fabricator experience qualifications

1.6 QUALITY ASSURANCE

A. Perform Work according to AWS Section 6 and Section 7 custom grade.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented production experience similar to this Project

B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented production experience similar to this Project

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Protect Work from moisture damage

C. Maintain storage space relative humidity within ranges indicated in AWS Section 2

1.9 AMBIENT CONDITIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation

B. Maintain storage space relative humidity within ranges indicated in AWS, Section 2

1.10 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings

PART 2 - PRODUCTS

2.1 INTERIOR FINISH CARPENTRY

A. Interior Standing and Running Trim: Hardwood lumber and plywood
1. Profile: Sizes and profiles as indicated on Drawings
2. Opaque-Finished Trim: AWS Section 6; custom grade
3. Transparent-Finished Trim: AWS Section 6; custom grade

B. Interior Finished Plywood Panels
1. Grade A Plywood
2. 3/4 in. x 4 ft. x. 8 ft.
3. Fill holes, indentions and fastener holes with oil base, tinted filler to match base finish
4. Sand work smooth
5. Apply Clear Finish per specification section 09 90 00

2.2 INTERIOR MATERIALS

A. Interior Hardwood Lumber:
1. Transparent-Finished Clear Maple species
2. Opaque-Finished Popular species
3. Cut: Plain sawn
4. Finger Jointing: Not permitted

B. Lumber Moisture Content Range: 8 to 13 percent

C. Interior Hardwood Plywood: HPVA HP-1; lumber core; Maple face species
1. Veneer Slicing: Rotary
2. Matching of Individual Leaves to Each Other: Book matching
3. Matching Across Panel Face: Center balanced matching
4. Matching or Relationship of Panels to Each Other: Sequence-matched, uniform-size sets matching

D. Particleboard: ANSI A208.1 Grade M2 or better; composed of wood chips or sawdust, medium density, made with water-resistant adhesive; sanded faces

E. Hardboard: AHA A135.4; pressed wood fiber with resin binder, tempered grade, 1/4 in thick, smooth one side

F. Pegboard: Pressed wood fiber with resin binder, tempered grade; 1/4 in thick with 9/32 in diameter holes at 1 in on center

G. Sheet Metal Components: Stainless steel, Type 304 with No. 8 polished finish; 20 gauge thick

H. Synthetic Surfacing: Synthetic marble of polyester or proprietary resins, with integral color and design, stain resistant to domestic chemicals and cleaners

2.3 FABRICATION

A. Fabricate finish carpentry to AWS Section 6 custom grade

B. Shop assemble Work for delivery to Site, permitting passage through building openings

C. Fit exposed plywood edges with matching hardwood edging, where indicated. Use one piece for full length only

D. Shop prepare and identify components for book match grain matching during Site erection

E. When necessary to cut and fit on-Site, fabricate materials with ample allowance for cutting Furnish trim for scribing and Site cutting

2.4 FINISHES

A. Sand Work smooth and set exposed nails and screws

B. Apply wood filler in exposed nail and screw indentations

C. On items to receive transparent finishes, use wood filler matching surrounding surfaces and of types recommended for applied finishes
   1. Stain, seal and varnish exposed to view surfaces.
   2. Seal semi-concealed surfaces
   3. Prime paint or Seal surfaces in contact with cementitious materials

2.5 ACCESSORIES

A. Fasteners, Bolts, and Anchors: ASTM A153, hot-dip galvanized steel

B. Concealed Joint Fasteners: Threaded steel

C. Lumber for Shimming, Blocking, and shims: Softwood lumber.

D. Primer: Acrylic primer sealer type

E. Wood Filler: Solvent or Oil base, tinted to match surface finish color

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Requirements for installation examination

B. Verify adequacy of backing and support framing

C. Verify mechanical, electrical, and building items affecting Work of this Section are placed and ready to receive this Work

3.2 PREPARATION

A. Section 01 73 00 - Execution: Requirements for installation preparation

B. Prime paint surfaces of wood items and assemblies to be in contact with cementitious materials

C. Prime paint surfaces of wood items and assemblies

3.3 INSTALLATION

A. Modify and extend existing finish carpentry installations using materials and methods as specified

B. Install Work according to AWS Section 6 and Section 7 custom grade and manufacturer's instructions

C. Set and secure materials and components in place, plumb and level

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 in
   1. Do not use additional overlay trim to conceal larger gaps

E. Install components and trim with nails screws bolts with blind fasteners as required

F. Site-Applied Wood Treatment:
   1. Brush apply two coats of preservative treatment on wood in contact with cementitious materials
   2. Treat Site-sawn cuts. Apply preservative to Site-sawn cuts according to WDMA I.S.4
   3. Allow preservative to dry prior to erecting members

G. Preparation for Site Finishing:
   1. Set exposed fasteners. Apply wood filler in exposed fastener indentations.
   2. Sand Work smooth
   3. Site Finishing: Comply with Section 09 90 00 - Painting and Coating

3.4 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Requirements for tolerances

B. Maximum Variation from Indicated Position: 1/16 in

C. Maximum Offset from Alignment with Abutting Materials: 1/32 in

END OF SECTION

SECTION 06 41 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Custom casework
      a. Plastic laminate finished casework
   2. Counter tops.
      a. Plastic laminate finished counter tops
      b. Synthetic surfacing counter tops
      c. Metal Finished Counter Tops
   3. Cabinet hardware

B. Related Requirements:
   1. Section 06 10 53 - Miscellaneous Rough Carpentry: Grounds and support framing
   2. Section 06 20 00 - Finish Carpentry

1.2 REFERENCE STANDARDS

A. American National Standards Institute:
   1. ANSI A135.4 - Basic Hardboard
   2. ANSI A156.9 - Cabinet Hardware
   3. ANSI A208.1 - Mat-Formed Wood Particleboard

B. APA - The Engineered Wood Association:
   1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood

C. Architectural Woodwork Institute, Woodwork Institute :
   1. AWS - Architectural Woodwork Standards
   2. Supplemented with The WI Approach

D. ASTM International:
   1. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
   2. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood Base Fiber and Particle Panel Materials
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
   4. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples

E. Forest Stewardship Council:
   1. FSC Guidelines - Forest Stewardship Council Guidelines

F. Green Seal:
   1. GS-11: Product Specific Environmental Requirements.

G. Hardwood Plywood and Veneer Association:
   1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood

H. National Electrical Manufacturers Association:
   1. NEMA LD 3 - High-Pressure Decorative Laminates

I. National Fire Protection Association:
   1. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

J. U.S. Department of Commerce National Institute of Standards and Technology:
   1. DOC PS 20 - American Softwood Lumber Standard

K. Western Red Cedar Association:
   1. WRCA - Lumber Grades and Standards

L. Window and Door Manufacturers Association:
   1. WDMA I.S.4 - Water-Repellent Treatment for Millwork

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals, including AWS Section 1

B. Product Data: Submit data on:
   1. High-pressure decorative laminates
   2. Hardware accessories

C. Shop Drawings:
   1. Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, schedule of finishes, and Certified Compliance Label on each set

D. Samples:
   1. Submit two, 8 x 10 in samples, illustrating cabinet finish
   2. Submit two, 8 x 10 in samples, illustrating counter top finish

E. Qualification Statements:
   1. Submit qualifications for fabricator

1.4 QUALITY ASSURANCE

A. Perform Work according to Architectural Woodwork Institute, Woodwork Institute; premium grade.

1.5 QUALIFICATIONS

A. Fabricator: Company specializing in fabricating products specified in this Section with minimum five years' documented production experience similar to this Project

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Protect units from moisture damage

1.7 AMBIENT CONDITIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient conditions control facilities for product storage and installation.

B. Maintain storage space relative humidity within ranges indicated in AWS Section 2

C. Subsequent Conditions: Maintain same temperature and humidity conditions in building spaces as will occur after occupancy during and after installation of Work of this Section

1.8 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings

PART 2 - PRODUCTS

2.1 CUSTOM CASEWORK

A. Plastic-Laminate-Finished Custom Casework:
1. Face-framed construction
2. Style: Flush overlay
3. AWS Section 10
4. Premium grade
5. Exterior and Interior Exposed Surfaces: High-pressure decorative laminate over particleboard
6. Semi-Exposed Surfaces: Melamine coated particleboard

B. Casework Construction Details:
1. Drawer Side Joinery: Doweled
2. Drawer and Door Edge Profile: Square with thin, applied vinyl band
3. Toe Base Finish: As indicated on the drawings

C. Synthetic Surfacing Counter Tops: Refer to specification section 06 65 00 Solid Surfacing
1. Nominal sheet thickness: Indicated on Drawings
2. Splash Top Profile: Square with scribe
3. Deck at Splash Joint Type: Vertical butt
4. Front Edge: As indicated on drawings
5. Splash Assembly: Field assembled
6. Color: Refer to specification section 06 65 00 Solid Surfacing

D. Metal Finished Counter Tops
1. Sheet Steel per: 05 50 00 Cold Rold Sheet Steel
2. Core: ¾ inch Plywood or Particleboard
   a. Core at Sink Tops: Exterior or exterior glue type panels
3. Splash Top Profile: As indicated on drawings.
4. Deck at Splash Joint Type: Vertical butt
5. Front Edge: Hemmed edges sheet metal
6. Splash Assembly: Field assembled.

2.2 INTERIOR FINISH CARPENTRY

A. Shelving: Softwood lumber
1. Melamine Coated Particleboard Shelving
   a. Edging: Applied Vinyl thin band
   b. Band Width: Match Shelf thickness

2.3 CASEWORK MATERIALS

A. Softwood Lumber: DOC PS 20; WI Custom maximum moisture content of 6-8 percent
   1. Species: Douglas fir - Larch or Pine.
   2. Cut: Plain sawn.

B. Hardwood Lumber: DOC PS 20. WI Premium Grade; maximum moisture content of 6-8 percent
   1. Species:
      a. Stained finish - Red Oak
      b. Painted finish - Poplar
   2. Cut: Plain sawn

C. Softwood Plywood: APA/EWA PS 1 softwood plywood with lumber core and the following:
   1. Grade: C-D
   2. Face Veneer: Douglas Fir
   3. Veneer Slicing: Rotary
   4. Matching of Individual Leaves to Each Other: Book matching
   5. Matching Across Panel Face: Center balanced matching
   6. Matching or Relationship of Panels to Each Other: Sequence-matched, uniform-size sets matching

D. Hardwood Plywood: AWI Grade AA veneer; WI Premium veneer; with lumber core; and the following:
   1. Grade: A-A
   2. Face Veneer: Red Oak
   3. Veneer Slicing: Rotary
   4. Matching of Individual Leaves to Each Other: Book matching
   5. Matching Across Panel Face: Center balanced matching
   6. Matching or Relationship of Panels to Each Other: Blueprint-matched panels and components matching

E. Decorative Overlay Plywood: APA/EWA PS 1 and HPVA HP-1; particleboard core, melamine or polyester decorative faces; PVC or polyester edge banding; color and pattern as selected

F. Particleboard: ANSI A208.1 Grade M2 or better; composed of wood chips or sawdust, medium density

G. Medium-Density Fiberboard: ANSI A208.2, composed of wood fibers, medium density

H. Medium-Density Overlay: APA/EWA PS 1; softwood plywood, exterior type, with paper face suitable for opaque finish

I. Hardboard: AHA A135.4; pressed wood fiber with resin binder, tempered grade, 1/4 in thick, smooth one side

J. Laminate:
   1. 3-D Decorative Laminate: NEMA LD 3; Formable overlays, PVC or polyethylene polymers; color, pattern, and surface texture as selected
      a. Vertical Surfaces: VGS; 0.016 in thick
   2. High-Pressure Decorative Laminate (HPDL): NEMA LD 3; color, pattern, and surface texture as selected
      a. Horizontal Surfaces: HGS; 0.048 in thick
      b. Vertical Surfaces: VGS; 0.028 in thick
      c. Cabinet Liner: CLS; 0.020 in thick

d. Backing Sheet: BKL; 0.020 in thick

K. Sheet Metal Components: Stainless steel, Type 304 with No 4 satin finish; 20 gauge

L. Synthetic Solid Surfacing: Refer to specification section 06 65 00

2.4 FABRICATION

A. Fabricate casework to AWS Section 10 premium grade

B. Fabricate counter tops to AWS Section 11 premium grade

C. Shop-assemble casework for delivery to Site in units easily handled and to permit passage through building openings

D. Fit exposed plywood edges with PVC plastic edging. Use one piece for full length only

E. Cap exposed high-pressure decorative laminate finish edges with PVC plastic trim

F. Door and Drawer Fronts:
1. Thickness: 3/4 in
2. Finish: 3-D Decorative Laminate

G. When necessary to cut and fit on-site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting

H. Apply high-pressure decorative laminate finish in full, uninterrupted sheets consistent with manufactured sizes
1. Fit corners and joints hairline; secure with concealed fasteners
2. Slightly bevel arises
3. Locate plastic laminate joints minimum 18 in from sink cutouts

I. Apply laminate backing sheet to reverse side of plastic- laminate-finished surfaces where required by AWS for specified grade

J. Fabricate metal counter top surfaces pressure glued to plywood or particle board core backing without visible joints

K. Fabricate cabinets and counter tops with cutouts for plumbing fixtures, inserts, appliances outlet boxes, fixtures, and fittings
1. Verify locations of cutouts from on-Site dimensions. Seal cut edges.

2.5 FINISHES

A. Sand Work smooth and set exposed nails and screws

B. Apply wood filler in exposed nail and screw indentations

C. On items to receive transparent finishes, use wood filler matching surrounding surfaces and types recommended for applied finishes

D. Prime paint or seal surfaces in contact with cementitious materials

E. Finish according to Section 09 90 00 - Painting and Coating

2.6 ACCESSORIES

A. Adhesive for High-Pressure Decorative Laminates: Type recommended by laminate manufacturer to suit application

B. Fasteners and Anchors:
1. Fasteners: ASTM B695, Class 55 mechanically galvanized steel for high-humidity

and treated wood locations, unfinished steel elsewhere
2. Nails and Staples: ASTM F1667

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; chrome finish in concealed locations and chrome finish in exposed locations

D. Concealed Joint Fasteners: Threaded steel

E. Grommets: Plastic material for cut-outs
1. Size: As shown on the drawings

F. Plastic Edge Trim: AWS; standard PVC; color as selected manufacturers full range of colors

G. Glass: Type as specified in Section 08 80 00 - Glazing.

2.7 HARDWARE

A. Cabinet Adjustable Shelf Supports: In-line bored holes 1-3/8 in o.c., to within 6 in of top and bottom of opening with four support pins for each shelf
1. Vinyl coated steel, pin size 4.7 mm x 5/16"
2. Quality Standard - Knape & Vogt 348

B. Shelf Standards and Rests: Formed steel channels and rests, cut for fitted rests spaced as shown on drawings;
1. Finish: as selected
2. Quality Standard - Knape & Vogt 255 and 256

C. Shelf Brackets: Formed steel brackets, formed for attachment with lugs;
1. Size: As shown on the drawings
2. Finish: Chrome
3. Quality Standard - Knape & Vogt Super duty standard and brackets

D. Drawer and Door Pulls:
1. Type: Standard wire pulls unless called out on drawings.
2. Size and Spacing: 4" pulls unless called out on drawings
3. Finish: US26D satin chrome unless otherwise called out on drawings

E. Cabinet Locks:
1. Type: Pin tumbler type suitable for location
2. Keying: Key locks separately
a. Stamp keys consecutively beginning with "1"
b. Key to facility master key
3. Quality Standard: Schlage CL-series

F. Catches:
1. Plastic case, magnet type
2. Quality Standard - Hafele 246.50.708

G. Drawer Slides: Self-closing, galvanized steel construction, ball bearings separating tracks, rail mounted full extension type
1. Load Rating: 100lb for standard drawers, 150lbs for lateral file
2. Quality Standards -
a. Standard Drawers - Accuride 3832
b. Lateral Files - Accuride 4005

H. Hinges:
1. European style, free swinging

2. Quality Standard - Grass 2-Dimensional Series

I. Pre-Fabricated ADA Toe Kick: Richelieu Hardware - Pre-Fab Toe Kick (Or Similar)
1. Color to match rubber base
2. Size: Coordinate with casework drawings

J. Counter Top Support Brackets:
1. Rakks, Concealed EH Countertop Support Bracket (or Approved Alternate):
a. Sizes as indicated on drawings:
1) EH-1818FM (counters up to 24” depth) Off- White Finish (Typical at SDS Countertop)
2) EH-1824FM (counters up to 30” depth) Off- White Finish (Typical at STL-1 Countertop)
3) EH-1416BFM (benches up to 16” deep) Black Powder Coat (Typical at STL-1 Bench at lockers)
b. Finish: Off-White Finish – Coordinate with drawings for location
c. Finish: Black Powder Coat – Coordinate with drawings for location

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Requirements for installation examination

B. Verify adequacy of backing and support framing

C. Verify location and sizes of utility rough-in associated with Work of this Section

3.2 PREPARATION

A. Section 01 73 00 - Execution: Requirements for installation preparation

3.3 INSTALLATION

A. Install casework according to AWS Section 10 premium grade

B. Install counter tops according to AWS Section 11 premium grade

C. Caulk all joints between backsplash and counter top
1. Color: Match counter top

D. Caulk all joints between backsplash, counter top and walls
1. Color: Match counter top.

E. Set and secure casework, interior finish carpentry, and counter tops in place; rigid, plumb, and level

F. Use fixture attachments in concealed locations for wall-mounted components

G. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops

H. Carefully scribe casework abutting other components, with maximum gaps of 1/32 in. use additional overlay trim for this purpose

I. Secure woodwork cabinet and counter bases to floor using appropriate angles and anchorages

J. Countersink anchorage devices at exposed locations
1. Conceal with solid wood plugs of species to match surrounding wood; finish flush

with surrounding surfaces

3.4 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Requirements for tolerances

B. Maximum Variation from Indicated Position: 1/16 in

C. Maximum Offset from Alignment with Abutting Materials: 1/32 in

3.5 ADJUSTING

A. Section 01 77 00 - Closeout Procedures: Requirements for starting and adjusting

B. Adjust moving or operating parts to function smoothly and correctly

3.6 CLEANING

A. Section 01 73 00 - Execution: Progress Cleaning

B. Clean casework, counters, shelves, hardware, fittings, and fixtures

END OF SECTION

SECTION 06 64 00

PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic sheet paneling.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For plastic paneling and trim accessories.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. Glass-Fiber-Reinforced Plastic Paneling (FRP-1): Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Composites, Inc.
   b. Glasteel.
   c. Marlite.
   d. Newcourt, Inc.
   e. Nudo Products, Inc.
   f. Parkland Plastics, Inc.
2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency in accordance with ASTM E84. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.
3. Nominal Thickness: Not less than 0.075 inch.
4. Surface Finish: Molded pebble texture
5. Color: White

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: White.

B. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive.

D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION

SECTION 06 65 00

SOLID SURFACING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Solid Surface Material, counter tops and accessories.

1.2 SYSTEM DESCRIPTIONS

A. Homogenous sheet material composed of acrylic resins, fire-retardant filler materials, and coloring agents.

1.3 SUBMITTALS

A. Comply with Section 01 33 00, unless otherwise indicated.

B. Product Data:
1. Detailed specification of construction and fabrication.
2. Manufacturer's installation instructions.
3. Manufacturer's detailed recommendations for handling, storage, installation, protection, and maintenance.

C. Shop Drawings: Installation details including location and layout of each type of fabrication and accessory.

D. Samples: Full range of colors and patterns.

E. Contract Closeout Submittals: Comply with Section 01 77 00.

F. Fabricator Qualifications: Certified solid surface fabricator/installer.

G. Installer Qualifications: Firm experienced in installation or application of systems similar in complexity to those required for this Project, including specific requirements indicated.
1. Acceptable to or licensed by manufacturer.

H. Source Limitations: Obtain materials and products from single source.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver fabrications appropriately wrapped in protective materials.

B. Protect fabrications from damage.

1.5 PROJECT CONDITIONS

A. Maintain relative humidity planned for building occupants and an ambient temperature between 65 and 75 degrees Fahrenheit for 48 hours prior to and during installation. After

B. Installation, maintain relative humidity and ambient temperature planned for building occupants.

1.6 WARRANTY

A. Furnish manufacturer's limited 10 year warranty.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Basis of Design:
   1. Staron, Latte Chemical USA: Color- Tempest Whippoorwill

B. Provide similar color as basis of design for approval prior to bid from the following approved manufacturers:
   1. Avonite Surfaces
   2. Corian
   3. Formica Corporation
   4. LG Chemical, Ltd.
   5. Meganite, Inc.
   6. Wilsonart International. Gibraltar® Solid Surface.

C. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENT

A. SOLID SURFACE SHEET
   1. Nominal sheet thickness: Indicated on Drawings.
   2. Color: Tempest Whippoorwill, LOTTE Staron
   3. Surface burning characteristics in accordance with ASTM E84: Class I or A, and as follows:
   4. Flame spread: <25.
   5. Smoke developed: <25.
   6. Liquid Absorption, ISO 4586-2, for ½ inch material thickness: 0.4 percent after 2 hour period.
   7. Izod Impact, ASTM D256, Method A: 0.3 foot pounds per inch.
   8. Tensile Modulus, ASTM D638 Nominal: ½ million pounds per square inch.
   9. Thermal Expansion, ASTM D696: 0.000018 inch per inch per degree F, maximum.
   10. Hardness, ASTM D 2583, Barcol Impressor: 57.
   11. Flexural Toughness, ASTM D790, 3 (in.-lb,/in^3).
   12. Deflection Temperature under load, ASTM D648: 90 degrees C.
   13. Stain Resistance, ANSI Z-124.3 Modified; 3.4: No effect.
   14. Boiling Water Resistance, NEMA LD 3-3.05: No effect.

15. High Temperature Resistance, NEMA LD 3-3.06: No effect.
16. Radiant Heat Resistance, NEMA LD 3-3.10: No effect.
17. Light Resistance, NEMA LD 3-3.03: No effect.
18. Ball Impact Resistance, NEMA LA 3-3.08, one half pound ball, unsupported: 125 inches.
19. Specific Gravity (Density ASTM D792): 1.60 grams per cubic centimeter.
20. Approximate weight: 4.20 pounds per square foot.
21. Weatherability, ASTM D2565: Pass.
22. Fungus Resistance, ASTM G21: Pass.
23. Bacterial Resistance, ASTM G22: Pass.
24. Pittsburgh Protocol Toxicity: 66.9 grams.
25. Patterns and Finishes: Selected from manufacturer's full range of available selections.

2.3 FABRICATIONS

A. Fabrication to be performed by a certified solid surface fabricator/installer.

B. Fabricate components in shop to greatest extent practical to size and shape indicated, in accordance with approved shop drawing and manufacturer's published requirements.

C. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 4" wide reinforcing strip under joints.

D. Provide holes and cutouts for plumbing and bath accessories as indicated on shop drawings.

E. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts then sand all edges smooth. Repair or reject defective or inaccurate work.

F. Finish: Surfaces shall have a uniform finish:
1. Matte: Standard finish for high traffic areas, requires the least amount of maintenance.

G. Thermoforming: Comply with forming data from manufacturer:
1. Construct matching molds to form components shapes.
2. Form pieces to shape prior to seaming and joining.
3. Cut pieces larger than finished dimensions, sand edges, remove all nicks and scratches.
4. Heat entire component uniformly between 280 - 325 degrees Fahrenheit during forming.
5. Prevent blistering, whitening or cracking of solid surface material during forming.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surfacing. Identify conditions detrimental to proper or timely installation. Do not commence installation until conditions have been corrected.

3.2 PREPARATION

A. Precondition Solid Surfacing in accordance with manufacturer's printed installation instructions.

3.3 INSTALLATION

A. Install components plumb and level, in accordance with approved shop drawings, project installation details and manufacturer printed instructions.

B. Form joints using manufacturer's approved adhesive, with joints inconspicuous in finished work.

C. Provide backsplashes and end splashes as indicated on the drawings. Adhere to countertops using manufacturer's recommended silicone sealant.

D. Remove excessive adhesive and sealants. Components shall be clean on date of Substantial Completion.

E. Coordinate plumbing installation with Division 22.

3.4 PROTECTION

A. Protect surfaces from damage until date of Substantial Completion. Repair or replace damaged components that cannot be repaired to architect's satisfaction.

B. Fabricator/Installer to provide the Owner a manufacturer's maintenance kit, review maintenance procedures and the manufacturer warranty with the Owner upon completion of the project.

END OF DIVISION

SECTION 07 11 00

DAMPPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes cold applied asphalt emulsion dampproofing

1.2 REFERENCES

A. ASTM International:
1. ASTM D41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing
2. ASTM D449 - Standard Specification for Asphalt Used in Dampproofing and Waterproofing
3. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
4. ASTM D3747 - Standard Specification for Emulsified Asphalt Adhesive for Adhering Roof Insulation
5. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free

B. National Roofing Contractors Association:
1. NRCA - The NRCA Waterproofing and Dampproofing Manual

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit properties of primer and asphalt emulsion

1.4 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements

B. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until membrane has cured

PART 2 PRODUCTS

2.1 COMPONENTS

A. Cold Asphaltic Materials:
1. Asphalt Emulsion: Conforming to ASTM D3747
2. Emulsified Asphalt: ASTM D1227; Type II Class 1 or Class II reinforced with non-asbestos fibers
3. Asphalt Primer: ASTM D41, compatible with substrate

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system

C. Verify items penetrating surfaces to receive dampproofing are securely installed

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing

B. Clean and prepare surfaces to receive dampproofing

C. Do not apply dampproofing to surfaces unacceptable to manufacturer or applicator

D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate

3.3 INSTALLATION

A. Prime surfaces in accordance with NRCA - Waterproofing Manual

B. Apply asphalt emulsion with roller

C. Apply bitumen in one coat, continuous and uniform, at rate of 2 gal/100 sq ft.

D. Apply from 2 inches below finish grade elevation to top of footings

E. Seal items Projecting through dampproofing surface with mastic

F. Seal watertight

G. Immediately backfill against dampproofing to protect from damage

END OF SECTION

DIVISION 07 THERMAL AND MOISTURE PROTECTION

SECTION 07 21 13

BOARD INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes rigid board insulation at perimeter foundation wall, exterior wall behind gypsum board wall finish, horizontally under slab at foundation perimeter, and above ceiling insulation board.

B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete: Board insulation at perimeter foundation wall
2. Section 07 21 16 - Blanket Insulation
3. Section 09 21 16 - Gypsum Board Assemblies: Board insulation behind gypsum board wall finish

1.2 REFERENCES

A. ASTM International:
1. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
2. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics
3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

B. Scientific Certification Systems (SCS):
1. SCS Recycled Content Certification.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit data on product characteristics, performance criteria, limitations and, adhesives

1.4 QUALITY ASSURANCE

A. Insulation Installed in Concealed Locations Surface Burning Characteristics:

B. Foam Plastic Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84

C. Insulation Installed in Exposed Locations Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements

B. Do not install adhesives when temperature or weather conditions are detrimental to successful installation

1.6 SEQUENCING

A. Section 01 10 00 - Summary: Work sequence

B. Sequence Work to ensure firestopping materials are in place before beginning Work of this section

1.7 COORDINATION

A. Section 01 31 00 – Project Management and Coordination

B. Coordinate Work with Section 07 26 00 for installation of vapor retarder and Section 07 27 26 for air seal materials

PART 2 - PRODUCTS

2.1 BOARD INSULATION

A. Manufacturers:
1. ACH Foam Technologies, LLC
2. DiversiFoam Products
3. Dow Chemical Company
4. Johns Manville
5. Owens Corning
6. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPONENTS

A. Extruded Polystyrene Insulation (XPS): ASTM C578 Type VI; cellular type, conforming to the following:
1. Board Size: 48 x 96 or 24 x 96 inch
2. Board Thickness: 2 inches
3. Thermal Resistance: R of 5.0 per inch
4. Water Absorption: In accordance with ASTM D2842; 0.3 percent by volume maximum
5. Compressive Strength: Minimum 25 psi
6. Board Edges: Square edges

B. Integrated Furring and Insulation System: Contractor's Option
1. Expanded Polystyrene insulation with metal Z furring: ASTM C578; expanded cellular type, conforming to the following:
a. Manufacturers:
1) Plymouth Foam Incorporated – Model: Gold-Wall
2) Divers/Foam Products – Model: Certistud
3) Substitutions: Section 01 60 00 - Product Requirements
b. Board Size: 4 x 8 feet
c. Board Thickness: 2 inches
d. Thermal Resistance: R of 8.0
e. Water Absorption: In accordance with ASTM C272 0.2 percent by volume maximum
f. Compressive Strength: Minimum 35 psi
g. Board Edges: Square edges
h. Furring Strips: 60 galvanized steel, 25 gauge, 24″ on center

C. Black Acoustic Board – Above Ceilings
   1. Basis of Design: Owens Corning SelectSound Black Acoustic Board
   2. Inorganic Glass Fiber
   3. Density: 3.0 pcf
   4. 2” Thickness
   5. Board Size: 48” X 96”

2.3 ACCESSORIES

A. Adhesive: Type recommended by insulation manufacturer for application

B. Tape: Type recommended by insulation manufacturer for application

C. Insulation Fasteners: Impaling clip of galvanized steel with washer retainer and clips, to be mechanically fastened to surface to receive board insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions

B. Verify substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive

C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances affecting adhesive bond

3.2 INSTALLATION - FOUNDATION PERIMETER

A. Apply adhesive in three continuous beads per board length to full bed 1/8 inch thick

B. Install boards on foundation wall perimeter, vertically or horizontally

C. Place boards in method to maximize contact bedding

D. Stagger side and end joints

E. Butt edges and ends tight to adjacent board and to protrusions

F. Extend boards over control or expansion joints, unbonded to foundation 6 inches on one side of joint

G. Cut and fit insulation tight to protrusions or interruptions to insulation plane

H. Immediately following application of board insulation, place protective boards over exposed insulation surfaces, apply adhesive in five continuous beads per board length

I. Install boards horizontally or vertically from base of foundation to top of insulation

J. Butt board joints tight; stagger from insulation joints

3.3 INSTALLATION - EXTERIOR WALLS

A. Secure boards to substrate by mechanical attachment to achieve continuous flush insulation surface

B. Fastener: 6 per insulation board

C. Apply adhesive in three continuous beads per board length to full bed 1/8 inch thick

1. Daub adhesive tight to protrusions

D. Install boards on wall surface, vertically or horizontally

E. Place boards in method to maximize contact bedding
   1. Stagger end joints. Butt edges and ends tight to adjacent board and to protrusions

F. Cut and fit insulation tight to protrusions or interruptions to insulation plane

G. Tape insulation board joints

3.4 INSTALLATION OF ABOVE CEILING INSULATION BOARD

A. Product should be kept dry during shipping, storage, and installation.

B. Board insulation shall be cut neatly with edges square to ceiling perimeters

C. Insulation shall be loose laid on top of ceiling panel system

D. Insure complete coverage of ceiling system

E. Hold gaps between boards to less than 1/8”

F. Cut boards around suspension wires as necessary to allow complete coverage of ceiling

G. Insulation board shall be cut to set on top of each acoustical panel

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protection of installed construction

B. Do not permit damage to insulation prior to covering

3.6 SCHEDULE

A. Foundation and Crawl Space: 2 inch; Extruded Polystyrene Insulation (XPS)

B. Exterior Walls, Exterior Face:
   1. XPS with “Z” furring framing support system

END OF SECTION

SECTION 07 21 16

BLANKET INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes batt insulation in exterior and interior wall construction and for filling perimeter window and door shim spaces, and crevices in exterior wall.

B. Related Sections:
1. Section 06 10 00 - Rough Carpentry; Wood stud framing
2. Section 07 21 13 - Board Insulation.
3. Section 07 27 16 - Fluid Applied Membrane: Air Barriers.
4. Section 09 21 16 - Gypsum Board Assemblies: Acoustic batt insulation within metal stud wall.

1.2 REFERENCES

A. ASTM International:
1. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
3. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

1.3 SYSTEM DESCRIPTION

A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements.

1.4 PERFORMANCE REQUIREMENTS

A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96/E96M.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on product characteristics, performance criteria, limitations.

1.6 QUALITY ASSURANCE

A. Insulation Installed in Concealed Locations Surface Burning Characteristics:
1. Batt Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.7 COORDINATION

A. Section 01 31 00 – Project Management and Coordination: Coordination and project conditions.

PART 2 PRODUCTS

2.1 BATT INSULATION

A. Manufacturers:
1. CertainTeed Insulation
2. Johns Manville.
3. Knauf Fiber Glass.
4. Owens Corning Fiberglas.
5. U.S. Gypsum Co. Thermafiber LLC.
6. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. Batt Insulation: ASTM C665; preformed glass mineral fiber batt, roll, or blanket; conforming to the following:
1. Walls
a. Thermal Resistance: R of 19.
2. Roll Size: 16 inch.

B. Staples: Steel wire; type and size to suit application.

C. Tape: Polyethylene self-adhering type, mesh reinforced, 2 inch wide.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify substrate, adjacent materials, and insulation are dry and ready to receive insulation.

3.2 INSTALLATION

A. Install in exterior walls and roof spaces without gaps or voids. Do not compress insulation.

B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

C. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.

D. Staple or nail facing flanges in place at maximum 6 inches oc.

E. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

F. Wood Framing: Place vapor retarder on warm side of insulation by stapling at 6 inches oc. Lap and seal sheet retarder joints over member face.

G. Coordinate Work of this section with construction of air barrier seal specified in Section 07 27 26.

END OF SECTION

SECTION 07 21 30

PRE-ENGINEERED BUILDING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-Engineered Building Insulation.

1.2 RELATED SECTIONS

A. Section 13 34 19 – Metal Building Systems

1.3 REFERENCES

A. ASTM International:
1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials in Sheet Form (Procedure B).
3. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
4. ASTM C 1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

B. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

C. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.4 DESIGN REQUIREMENTS

A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements.

B. Insulating system shall have a continuous vapor barrier inside of building purlins, girts, and insulation to provide complete isolation from inside conditioned air.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation instructions.

C. Shop Drawings: Indicate locations of connections and attachments, general details, anchorages and method of anchorage and installation.

D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square or long, representing actual products required for this project.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures: Closeout submittals.

1.7 QUALIFICATIONS

A. Manufacturer Qualifications: Company specializing in manufacturing product systems specified in this section with minimum five years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years experience approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store products indoors and protect from moisture, construction traffic, and damage.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. Section 01 77 00 – Closeout Procedures: Warranties.

B. Furnish ten-year limited year manufacturer’s material warranty.

PART 2 PRODUCTS

2.1 INSULATION SYSTEM

A. Manufacturer:
1. HIGH-R, Inc., Banded Solution
2. Thermal Design, Inc., Simple Saver System.
3. Substitutions: Section 01 60 00 - Product Requirements.

2.2 MATERIALS

A. System consists of Batt Insulation, Roof Insulation, Wall Insulation, Vapor Barrier Liner Fabric, Thermal Breaks, Straps, and other devices and components in insulation system as follows:
   1. Batt Insulation: ASTM C 991 Type 1; preformed formaldehyde-free glass fiber batt conforming to the following:
      a. Batt Size: Equal to purlin/girt spacing by manufacturer's standard lengths.
      b. Facing: Liner Fabric

2.3 COMPONENTS

A. Roof Insulation: Formaldehyde-free fiberglass batt or fiberglass blanket complying with ASTM C 991 Type 1 and ASTM E 84 with a thermal resistance and thickness as follows:
   1. Minimum R- Value: R-30; R-19 Cavity Insulation Between Purlins, R-11 above Purlins ran perpendicular. Provide thermal breaks at each purlin.

B. Wall Insulation: Formaldehyde-free fiberglass blanket or batt complying with ASTM C 991 Type 1, ASTM E 136 and ASTM E 84 with a thermal resistance and thickness as follows:
   1. Minimum R- Value: R-25; 8 inches.

C. Vapor Barrier Liner Fabric: Syseal® type woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene coatings, as follows:
   1. Product complies with ASTM C 1136, Types I through Type VI.
   2. Perm rating: 0.02 for fabric and for seams in accordance with ASTM E 96.
   3. Flame/Smoke Properties:25/50 in accordance with ASTM E 84.
   4. Self-extinguishes with field test using matches or butane lighter.
   5. Ultra violet radiation inhibitor to minimum UVMAX® rating of 8.
   6. Size and seaming: Manufactured in large custom pieces by extrusion welding from roll goods, and fabricated to substantially fit defined building area with minimum practicable job site sealing.
   7. Provide with factory triple, extrusion welded seams. Stapled seams or heat-melted seams are not acceptable due to degradation of fabric.
   8. Factory-folded to allow for rapid installation.
   9. Color: White.
   10. Vapor Barrier Lap Sealant: Solvent-based, Simple Saver polyethylene fabric adhesive.

D. Vapor Barrier Tape: Double-sided sealant tape 3/4 inch wide by 1/32 inch thick.

E. Vapor Barrier Patch Tape: Single-sided, adhesive backed sealant tape 3 inches wide made from same material as Syseal® type liner fabric.

F. Thermal Breaks:
   1. 3/16 inch thick by 3 inch wide white, closed-cell polyethylene foam with pre-applied adhesive film and peel-off backing.
   2. Polystyrene Snap-R snap-on thermal blocks.

G. Straps:
   1. 100 KSI minimum yield tempered, high-tensile-strength steel.
   2. Size: Not less than 0.020 inch thick by 1 inch by continuous length.

3. Galvanized, primed, and painted to match specified finish color on the exposed side.
4. Color: White.

2.4 ACCESSORIES

A. Fasteners:
   a. For light gage steel: #12 by 3/4 (19 mm) inch plated Tek 2 type screws with sealing washer, painted to match specified color.
   b. For heavy gage steel: #12 by 1-1/2 inch (38 mm) plated Tek 4 type screws with sealing washer, painted to match specified color.

B. Wall Insulation Hangers: Preformed rigid hangers, 32 inch long galvanized steel strips with barbed arrows every 8 inches along its length.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution

B. Verify that building structure including all bracing and any concealed building systems are completed and approved prior to installing liner system and insulation in the structure.

C. Correct any unsatisfactory conditions before proceeding.

D. If conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION - GENERAL

A. Install pre-engineered building insulation system in accordance with manufacturer's installation instructions and the approved shop drawings.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install in exterior spaces without gaps or voids. Do not compress insulation.

D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

E. Fit insulation tight in spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.

3.3 ROOF INSULATION INSTALLATION

A. Straps:
   1. Cut straps to length and install in the pattern and spacings indicated on shop drawings.
   2. Tension straps to required value.

B. Vapor Barrier Fabric:
   1. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.
   2. Position pre-folded fabric on the strap platform along one eave purlin.

3. Clamp the two bottom corners at the eave and also centered on the bay.
4. Pull the other end of the pleat-folded fabric across the building width on the strap platform, pausing only at the ridge to fasten the straps and fabric in position where plane of roof changes and to release temporary fasteners on the opposite ridge purlins.
5. Once positioned, install fasteners from the bottom side at each strap/purlins intersection.
6. Trim edges and seal along the rafters.
7. All seams must be completely sealed and stapled seams not acceptable.

C. Insulation:
1. Unpack, and shake to a thickness exceeding the specified thickness.
2. Ensure that cavities are filled completely with insulation.
3. Place on the vapor barrier liner fabric without voids or gaps.
4. Place top layer of insulation over and perpendicular to the purlins without voids or gaps, as roof sheathing is applied.
5. Place thermal block on top of purlins or bottom of purlins for retrofit work, if no other thermal break exists.
6. Place insulation between purlins at the required thickness for the R-value specified.

D. Seal vapor barrier fabric to the wall fabric and elsewhere as required to provide a continuous vapor barrier.

3.4 WALL INSULATION INSTALLATION

A. Insulation:
2. Install thermal break to exterior surface of girts as wall sheathing is applied.
3. Install self-sticking foam thermal break to interior surface of girts prior to installation of insulation.
4. Position and secure hangers to girts on the inside face of the wall sheathing.
5. Cut insulation to required lengths to fit vertically between girts.
6. Fluff the insulation to the full-specified thickness.
7. Neatly position in place and secure to hangers.
8. Ensure that cavities are filled completely with insulation.

B. Vapor Barrier Fabric:
1. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.
2. Apply the vapor barrier fabric by clamping it in position over eave strap and installing fasteners through the eave strap into each roof strap, permanently clamping the wall fabric between them.
3. Once in position, draw the vapor barrier fabric down over the column flanges to the base angle and install vertical straps along each column and 5 feet 0 inches on center, maximum, fastening to each girt to retain system permanently in place.
4. All seams must be completely sealed and stapled seams not acceptable.

C. Seal wall fabric to the roof fabric, to the base angle and up the columns to provide a continuous vapor barrier.

3.5 CLEANING

A. Section 01 73 00 - Execution: Progress cleaning.

B. Section 01 77 00 – Closeout Procedures: Final cleaning.

C. Clean dirt or exposed sealant from the exposed vapor barrier fabric.

D. Remove scraps and debris from the site.

3.6 PROTECTION

A. Section 01 73 00 - Execution: Protection of installed construction.

B. Protect system products until completion of installation.

C. Repair or replace damaged products before completion of insulation system installation.

3.7 SCHEDULE

A. Roof Insulation: R-30.

B. Wall Insulation: R-25.

END OF SECTION

SECTION 07 25 00

WEATHER BARRIERS (Contractor's Option, in lieu of Section 07 27 26)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Weather barrier membrane
2. Seam Tape
3. Flashing
4. Fasteners

B. Related Sections:
1. Section 07 90 00 - Joint Protection: Sealant materials and installation techniques
2. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard and sheathing
3. Section 08 41 13 - Aluminum-Framed Entrances and Store: Product requirements for window placement

1.2 REFERENCES

A. ASTM International:
1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
2. ASTM C1193; Standard Guide for Use of Joint Sealants
3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E96; Test Method for Water Vapor Transmission of Materials
7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls
8. ASTM E2178; Test Method for Air Permeance of Building Materials
9. ASTM E2357; Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

B. AATCC – American Association of Textile Chemists and Colorists
1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

C. TAPPI
1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.3 PERFORMANCE REQUIREMENTS

A. Provide continuity of air seal materials and assemblies in conjunction with materials described in other Sections

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit data on material characteristics, performance criteria, and limitations
1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements

C. Weather Barrier Warranty: Manufacturer’s executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion

1.5 QUALIFICATIONS

A. Fabricator: Company specializing in fabricating products specified in this Section with minimum five years' documented production experience similar to this Project

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Deliver weather barrier materials and components in manufacturer’s original, unopened, undamaged containers with identification labels intact

C. Store weather barrier materials as recommended by weather barrier manufacturer

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements

B. Maintain temperature and humidity recommended by materials manufacturers before, during and after installation

1.8 SEQUENCING

A. Section 01 10 00 - Summary: Work sequence.

B. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly

C. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation

1.9 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions

B. Coordinate the Work of this section with sections referencing this section

1.10 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties

B. Furnish ten (10) years manufacturer warranty for weather barrier from date of final weather barrier installation

PART 2 - PRODUCTS

2.1 WEATHER BARRIERS

A. Manufacturers:
   1. DuPont (Tyvek)
   2. Grace Construction Products
   3. Rubber Polymer Corporation, Inc
   4. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPONENTS

A. Sheet: Spun-bonded polyolefin, non-woven, non-perforated
   1. Performance Characteristics:
      a. Air Penetration:
         1) 0.001 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2178
         2) Type I per ASTM E1677
         3) ≤0.04 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2357
      b. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B
      c. Water Penetration Resistance: Minimum 280 cm when tested in accordance with AATCC Test Method 127
      d. Basis Weight: Minimum 2.7 oz/yd^2, when tested in accordance with TAPPI Test Method T-410
      e. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460
      f. Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with ASTM D882, Method A
      g. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117
      h. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed: 10

2.3 ACCESSORIES

A. Seam Tape: As recommended by the weather barrier manufacturer

B. Fasteners:
   1. 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap or manufacturer approved 1-1/4” or 2” metal gasketed washer

C. Sealants: Recommended by the weather barrier manufacturer

D. Adhesives:
   1. Provide adhesive recommended by weather barrier manufacturer
   2. Products: Adhesives recommend by the weather barrier manufacturer

E. Primers:
   1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing
   2. Products: Primers recommended by the flashing manufacturer

F. Flashing
   1. Flexible membrane flashing materials for window openings and penetrations recommended by manufacturer
   2. Straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc. recommended by manufacturer
   3. Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials
   4. Preformed Inside and Outside Corners and End Dams: Preformed three-dimensional shapes to complete the flashing system used in conjunction with Thru-Wall Flashing

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions

B. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories

3.2 INSTALLATION

A. Weather Barrier
1. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations
2. Install weather barrier prior to installation of windows and doors
3. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap
4. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level
5. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer
6. Window and Door Openings: Extend weather barrier completely over openings.
7. Overlap weather barrier
    a. Exterior corners: minimum 12 inches
    b. Seams: minimum 6 inches
8. Weather Barrier Attachment:
    a. Attach weather barrier to studs through exterior sheathing.
        1) Secure using weather barrier manufacturer recommend fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally
9. Apply flashing to weather barrier membrane prior to installing cladding anchors

B. Seaming
1. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams
2. Seal any tears or cuts as recommended by weather barrier manufacturer

C. Window Flashing
1. Preparation
    a. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
    b. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing
        1) Temporarily secure weather barrier flap away from sheathing with tape
2. Flashing
    a. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening
    b. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill
        1) Adhere to rough opening across sill and up jambs a minimum of 6 inches
        2) Secure flashing tightly into corners by working in along the sill before adhering up the jambs
    c. Fan flexible flashing at bottom corners onto face of wall
        1) Firmly press in place. Mechanically fasten fanned edges
    d. Apply 9-inch wide strips of flashing at jambs. Align flashing with interior edge of jamb framing

1) Start flashing at head of opening and lap sill flashing down to the sill
e. Spray-apply primer to top 6 inches of jambs and exposed sheathing
f. Install flexible flashing at opening head using same installation procedures used at sill
1) Overlap jamb flashing a minimum of 2 inches
g. Coordinate flashing with window installation
h. On exterior, install backer-rod in joint between window frame and flashed rough framing
1) Apply sealant at jambs and head, leaving sill unsealed
2) Apply sealants in accordance with sealant manufacturer's instructions and ASTM C1193
i. Position weather barrier head flap across head flashing
1) Adhere using flashing over the 45-degree seams
j. Tape top of window in accordance with manufacturer recommendations
k. On interior, install backer rod in joint between frame of window and flashed rough framing
1) Apply sealant around entire window to create air seal.
2) Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193

D. Thru – Wall Flashing at window head
1. Cut flap in weather barrier at window head
2. Prime exposed sheathing
3. Install lintel as required. Verify end dams extend 4 inches minimum beyond opening
4. Install end dams bedded in sealant
5. Adhere 2 inches minimum thru-wall flashing to wall sheathing
a. Overlap lintel with thru-wall flashing and extend ¼ inch minimum beyond outside edge of lintel to form drip edge
6. Apply sealant along thru-wall flashing edges
7. Fold weather barrier flap back into place and tape bottom edge to thru-wall flashing
8. Tape diagonal cuts of weather barrier
9. Secure weather barrier flap with fasteners

E. Thru – Wall Flashing
1. Apply primer per manufacturer's written instructions
2. Install preformed corners and end dams bedded in sealant in appropriate locations along wall
3. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet
4. Extend membrane through wall and leave ¼ inch minimum exposed to form drip edge
5. Roll flashing into place ensuring continuous and direct contact with substrate
6. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant
7. Terminate membrane on vertical wall
8. Apply sealant bead at each termination

3.3 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction

B. Do not permit adjacent work to damage work of this section

END OF SECTION

SECTION 07 27 26

FLUID-APPLIED WEATHER BARRIERS (Contractor's Option, in lieu of Section 07 25 00)

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 fluid-applied, vapor-permeable membrane weather barriers.

B. Related Requirements:
   1. Section 06 10 00 "Rough Carpentry" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.
   1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   2. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
   1. Protect substrates from environmental conditions that affect air-barrier performance.
   2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor- permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.004 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 283 ASTM E 783 or ASTM E 2357.

2.3 VAPOR-PERMEABLE MEMBRANE AIR-BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: synthetic polymer membrane.
   1. Synthetic Polymer Membrane:
      a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
         1) Carlisle Coatings & Waterproofing Inc.
         2) Grace Construction Products; W.R. Grace & Co. -- Conn.
         3) Henry Company, Sealants Division.
         4) Sto Corp.
         5) Tremco Incorporated.
         6) Prosoco

   2. Physical and Performance Properties:
      a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
      b. Vapor Permeance: Minimum 10 perms; ASTM E 96/E 96M.
      c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.
      d. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Primer: Liquid primer recommended for substrate by air-barrier material manufacturer.

C. Counterflashing Strip: Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, cross-laminated polyethylene film with release liner backing.

D. Modified Bituminous Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.

E. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.

F. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

G. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

H. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.

I. Modified Bituminous Transition Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.

J. Adhesive-Coated Transition Strip: Vapor-permeable, 17-mil- thick, self-adhering strip consisting of an adhesive coating over a permeable laminate with a permeance value of 37 perms.

K. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 07 90 00 "Joint Protection."

L. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
   1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
   2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
   3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
   4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
   1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of fluid air-barrier material and embed a joint reinforcing strip in preparation coat.

B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of fluid air-barrier material at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier material over joint reinforcing strip.

3.4 TRANSITION STRIP INSTALLATION

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   2. Install modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
   1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply elastomeric flashing sheet so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
   1. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, counterflashing strip.

J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.
   1. Apply primer to substrates at required rate and allow it to dry.
   2. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
   3. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

B. Apply strip and transition strip a minimum of 1 inch onto cured air-barrier material according to air-barrier manufacturer's written instructions.

C. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
   2. Continuous structural support of air-barrier system has been provided.
   3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
   4. Site conditions for application temperature and dryness of substrates have been maintained.

5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Strips and transition strips have been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Tests: As determined by Owner's testing agency from among the following tests:
1. Qualitative Air-Leakage Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, smoke pencil with pressurization or depressurization.
2. Quantitative Air-Leakage Testing: Air-barrier assemblies will be tested for air leakage according to ASTM E 783.
3. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 30 lbf/sq. in. according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.

D. Air barriers will be considered defective if they do not pass tests and inspections.
1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION

SECTION 07 42 13

METAL WALL PANELS/SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Preformed metal siding system for walls
2. Related flashings and trim
3. Accessories

B. Related Sections:
1. Section 05 12 00 - Structural Steel Framing: Structural steel building frame
2. Section 05 40 00 - Cold-Formed Metal Framing: Stud wall framing system
3. Section 07 21 16 - Blanket Insulation
4. Section 07 26 00 - Vapor Retarders: Vapor Retarders
5. Section 07 27 26 - Fluid-Applied Membrane Air Barriers
6. Section 07 62 00 - Sheet Metal Flashing and Trim including metal coping
7. Section 07 90 00 - Joint Protection: Sealant at perimeter, openings, and dissimilar materials
8. Section 08 12 14 - Standard Steel Frames: Exterior Doors
9. Section 08 36 13 - Sectional Doors: Door Trim
10. Section 08 41 13 - Aluminum Framed Entrances and Storefronts: Entry Doors
11. Section 08 51 13 - Aluminum Windows: Placement of Windows

1.2 REFERENCES

A. American Society of Civil Engineers:
1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures

B. ASTM International:
1. ASTM A755/A755M - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Pre-painted by the Coil-Coating Process for Exterior Exposed Building Products
2. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
4. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials

1.3 SYSTEM DESCRIPTION

A. System: Preformed and prefinished metal siding system of vertical and horizontal profile; site assembled; with sub-furring framing assembly

1.4 PERFORMANCE REQUIREMENTS

A. Components: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with applicable code

1. Design Pressure: Minimum 20 lb/sq ft

B. Maximum Allowable Deflection of Panel: 1/180 of span

C. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing

D. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system

E. Products: Provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials

F. Vapor Retarder: Provide continuity of vapor retarder at building enclosure elements in conjunction with vapor retarders specified in Section 07 26 00

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit data on panels

C. Samples: Submit two samples of wall panels, 2x2 inch in size illustrating finish color, sheen, and texture

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements

B. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap

C. Store prefinished material off ground protected from weather, to prevent twisting, bending, or abrasion, and to provide ventilation
1. Slope metal sheets to ensure drainage

D. Prevent contact with materials capable of causing discoloration or staining

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions

B. Coordinate Work for installation of vapor retarder and air barrier seals

C. Coordinate Work with installation of windows, doors, louvers, and adjacent components or materials

1.9 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds

B. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion

C. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within 25 years from date of Substantial Completion, including:
   1. Fluoropolymer Two- Coat System:
      a. Color fading in excess of 5 Hunter units per ASTM D 2244
      b. Chalking in excess of No. 8 rating per ASTM D 4214
      c. Failure of adhesion, peeling, checking, or cracking
   2. Modified Silicone-Polyester Two-Coat System:
      a. Color fading in excess of 5 Hunter units per ASTM D 2244, for vertical applications
      b. Color fading in excess of 7 Hunter units per ASTM D 2244, for non-vertical applications
      c. Chalking in excess of No. 8 rating per ASTM D 4214, for vertical applications
      d. Chalking in excess of No. 6 rating per ASTM D 4214, for non-vertical applications
      e. Failure of adhesion, peeling, checking, or cracking

PART 2 - PRODUCTS

2.1 METAL WALL PANELS

A. Manufacturers:
   1. Metal Sales
   2. ATAS International, Inc.
   3. Berridge Manufacturing Company
   4. Bridger Steel
   5. MBCI
   6. Nucor Building Systems
   7. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPONENTS

A. Exterior Pre-coated Panel and Other Sheet Materials:
   Pre-coated Steel Panel and Other Sheet Materials: Minimum 24 gauge thick pre-coated steel stock.
   a. Pre-coated Aluminum-Zinc Alloy Coated Steel: ASTM A755/A755M; AZ 50 aluminum-zinc alloy coating; shop pre-coated with manufacturer's standard thermosetting coating
   b. Exposed Exterior Surfaces: Color as selected from manufacturer's standard range

B. Exterior Vertical Metal Wall Panel/Siding (MP-2):
   1. Manufacturer:
      a. Metal Sales: TLC-3
      b. MBCI: FW-120-1
      c. Metal Span: FW 120
      d. Substitutions: Section 01 60 00 Product Requirements
   2. Profile: FW-120-1 with one bead
   3. Gauge: 24

4. Color: Selected from manufacturer's standard colors: Mistique Plus (W31)
5. Width: 12 inches

C. Miscellaneous Sheet Materials:
1. Pre-coated Galvanized Steel: Minimum 24 gage thick steel stock.
a. Aluminum-Zinc Alloy Coated Steel: ASTM A792/A792M Commercial - CQ Quality, Coating Designation AZ 50 aluminum-zinc alloy coating
b. Pre-coated Surfaces: Color as selected from manufacturer's standard range

D. Insulation:
1. Type specified in Section 07 21 16

E. Sub-girts: manufacturer's standard profile as indicated on Drawings; to attach panel system to structural frame

F. Thickness as required to support specified loads within specified deflection limitations

G. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; brake formed to required angles

H. Expansion Joints:
1. Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system
2. Exposed fasteners same finish as panel system

I. Trim, Closure Pieces, Caps, Flashings: Same material, thickness and finish as exterior sheets; brake formed to required profiles

J. Anchors: Type recommend by panel manufacturer

2.3 ACCESSORIES

A. Sealants:
1. Manufacturer's standard type suitable for use with installation of system
2. Color as selected to match siding

B. Fasteners:
1. Manufacturer's standard type to suit application; with soft neoprene washers; fastener cap same color as exterior panel
2. Exposed fasteners same finish as panel system

C. Power Actuated Fasteners: Steel, hot dip galvanized; with soft neoprene washers, fastener cap same color as exterior panel

D. Field Touch-up Paint: As recommended by panel manufacturer

E. Bituminous Paint: Asphalt base

2.4 FABRICATION

A. Form sections to shape indicated on Drawings, accurate in size, square, and free from distortion or defects

B. Form pieces in longest practicable lengths

C. Panel Profile: Manufacturer's standard profile for specified system

D. Fabricate corners in one continuous piece with minimum 18 inch returns

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions

B. Verify building framing members are ready to receive panel system

3.2 INSTALLATION

A. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint
   1. Allow to dry prior to installation

B. Fasten siding to structural supports; aligned, level, and plumb

C. Locate joints over supports. Lap panel ends minimum 2 inches.

D. Install expansion or control joints where indicated

E. Use manufacturer recommend fasteners unless otherwise approved by Architect

F. Seal to prevent weather penetration
   1. Maintain neat appearance

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

B. Maximum Offset From Indicated Alignment Between Adjacent Members Butting or In Line: 1/16 inch

C. Maximum Variation from Plane or Location Indicated on Drawings: 1/8 inch

3.4 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning

B. Remove site cuttings from finish surfaces

C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water

END OF SECTION

SECTION 07 53 05

ELASTOMERIC MEMBRANE ROOFING - MECHANICALLY ATTACHED

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes; insulation; and mechanically attached membrane roofing, base flashings, roofing membrane expansion joints and counterflashings

B. Related Sections:
1. Section 06 10 00 - Rough Carpentry: Wood roof sheathing
2. Section 06 10 53 - Miscellaneous Rough Carpentry: Wood nailers
3. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashing
4. Section 07 71 00 - Roof Specialties: Counterflashing
5. Section 07 72 33 - Roof Hatches: Counterflashing

1.2 REFERENCES

A. ASTM International:
1. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
2. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
3. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
4. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
5. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
6. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting
7. ASTM D6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing
8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
9. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
10. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings
11. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials

B. FM Global:
1. FM DS 1-28 - Wind Loads to Roof Systems and Roof Deck Securement
2. FM 4450 - Approval Standard for Class 1 Insulated Steel Deck Roofs

C. National Roofing Contractors Association:
1. NRCA - The NRCA Roofing and Waterproofing Manual

D. Single Ply Roofing Institute:
1. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

E. Underwriters Laboratories Inc.:
   1. UL - Fire Resistance Directory
   2. UL 790 - Tests for Fire Resistance of Roof Covering Materials
   3. UL 1256 - Fire Test of Roof Deck Construction
   4. UL 1897 - Uplift Tests for Roof Covering Systems.

1.3 SYSTEM DESCRIPTION

A. Elastomeric Sheet Membrane Conventional Roofing System: One ply membrane system with insulation, mechanically attached membrane

1.4 DESIGN REQUIREMENTS

A. Low Slope Membrane Roof Edge Securement: Conform to SPRI ES-1 for wind speeds determined from applicable code

1.5 PERFORMANCE REQUIREMENTS

A. Roof Assembly Classification: FM Class 1 Construction, windstorm classification of 1-90, in accordance with FM DS 1-28

B. Uplift Resistance: UL 1897; 90 psf uplift pressure resistance

C. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96/E96M

D. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 or initial SRI not less than 82 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

E. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

1.6 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Shop Drawings: Indicate setting plan for tapered insulation, conditions of interface with other materials. Indicate membrane layout and seam locations

C. Product Data: Submit characteristics on membrane materials, fasteners, seaming materials, flashing materials, insulation and related roofing items

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements

E. Manufacturer's Field Reports: Indicate procedures followed: ambient temperatures, humidity, and wind velocity during application

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience

B. Applicator: Company specializing in performing Work of this section with minimum five years documented experience approved by manufacturer with at least three installations of similar roofing system within the past two years

1.9 PRE-INSTALLATION MEETINGS

A. Section 01 31 00 – Project Management and Coordination: Pre-installation meetings

B. Convene minimum one week prior to commencing Work of this section

C. Review preparation and installation procedures and coordinating and scheduling required with related work

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact

C. Store products in weather protected environment, clear of ground and moisture

D. Store products in weather protected environment, clear of ground and moisture
Protect foam insulation from direct sunlight exposure

E. Protect foam insulation from direct exposure to sunlight

1.11 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site

B. Do not apply roofing membrane during inclement weather without proper weather protection

C. Do not apply roofing membrane when ambient and roof deck temperatures are below manufacturer' required temperature

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day

1.12 COORDINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Coordinate Work with installation of associated roof penetrations and metal flashings, as Work of this section proceeds

1.13 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Requirements for warranties

B. Furnish 30-year manufacturer's warranty including coverage of materials and installation and resulting damage to building resulting from failure to resist penetration of moisture

C. Furnish 5-year Roofing Contractor warranty including coverage of installation and resulting damage to building resulting from failure to resist penetration of moisture

PART 2 - PRODUCTS

2.1 SINGLE PLY ROOFING - MECHANICALLY ATTACHED

A. Manufacturers:
1. Carlisle SynTec Incorporated
2. Holcim Building Envelope - Elevate™
3. GAF Materials Corporation
4. Johns Manville.
5. Sika Sarnafil.
6. Versico.
7. Substitutions: Not Permitted

2.2 COMPONENTS

A. Membrane: 80 mil overall thickness, uncured white TPO membrane reinforced
1. In order to minimize seams on the roof, the minimum width of the membrane shall be 6 feet
2. The membrane shall have the following physical properties
3. Physical Properties:

Physical Property	Test Method	Typical Values
Tolerance on nominal thickness, %	ASTM D-751	±10
Thickness over scrim, in.	ASTM D-6878	0.024
Breaking Strength	ASTM D-751	250 min
Elongation break of reinforcement, %	ASTM D-751	15 min
Tear Strength	ASTM D-751	55 min
Brittleness	ASTM D-2137	-40 max
Linear dimensional change, %	ASTM D-1204	± 1 max
Ozone Resistance**	ASTM D-1149	Pass
Water absorption resistance, mass %	ASTM D-471	3.0 max
Factory seam strength, lbf /in.	ASTM D-751	66 min
Field seam strength, lbf /in.	ASTM D1876	25 min
Water Vapor Permeance, Perms	ASTM E96	0.10 max
Puncture Resistance, lbf	FTM 101C (Method 2031)	300 min
Solar Reflectance (initial)	ASTM E-1980	>82%
Thermal Emittance	ASTM E-408	> 0.90
Properties after heat aging	ASTMD573	670 hrs at 240° F
Breaking strength,%		90 min
Retained Elongation Reinforcement,%		90 min
Retained Tearing strength, %		60 min
Retained Weight Change, %		± 1.0 max

B. Seaming Materials: As recommended by membrane manufacturer

C. Mechanically Attached System: Provide membrane manufacturer's standard system of plates and fasteners for attachment of the membrane to substrate at sheet perimeter and at intermediate locations to meet requirement for FM I-90 wind uplift as per current requirements

D. Disc Washers and Screws: Disc washer: 2 inches in diameter, 22 gauge metal screws as recommended by membrane manufacturer to penetrate roof deck

E. Insulation: ASTM C1289, Type II, Class I, faced rigid cellular polyisocyanurate roof insulation, with the following characteristics:
   1. Board Density: 2 lb/cu ft
   2. Board Size: 48 x 96 inch
   3. Board Thickness: 2 inches, total thickness on roof 6" minimum
   4. Board Edges: square
   5. Thermal Conductivity: K factor of 25 as determined by ASTM C1289
   6. Compressive Strength: Minimum25 psi

F. Flexible Flashings: Same material and color as roof membrane; manufactured by roofing system manufacturer
   1. For field fabricated vent stacks, pipes and corners provide unreinforced 60 mil thick uncured white TPO

G. Counterflashings: metal, as specified in Section 07 62 00

H. Manufactured Roof Specialties: As specified in Section 07 71 00.

I. Control or Expansion Joint Flashing: Sheet butyl, metal counterflashings, and wood materials, as detailed

2.3 ACCESSORIES

A. Heat Weldable Walkway Pads: 180 mil thick uncured white TPO with safety yellow edge, Diamond plate tread pattern, 34 inches wide

B. Adhesive Materials: Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   1. Surface Conditioner: type compatible with membrane
   2. Membrane Adhesives: As recommended by membrane manufacturer
   3. Insulation Adhesive: As recommended by insulation manufacturer
   4. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane

C. Insulation Adhesive: As recommended by insulation manufacturer

D. Insulation Fasteners: Appropriate for purpose intended and approved by Factory Mutual and system manufacturer; length required for thickness of material with metal washers

E. Insulation Joint Tape: Type recommend by insulation manufacturer; 6 inches wide; self-adhering

F. Roofing Nails: Galvanized, hot dipped or non-ferrous type, size as required to suit application

G. Insulation Fasteners: Appropriate for purpose intended and approved by Factory Mutual and system manufacturer; length required for thickness of material with metal washers

H. Sealants: As recommended by membrane manufacturer

I. Stack Boots: Flexible boot and collar for pipe stacks through membrane

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Verify surfaces and site conditions are ready to receive work

C. Verify deck is supported and secure

D. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains and suitable for installation of roof system

E. Verify deck surfaces are dry and free of snow or ice

F. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and reglets are in place

3.2 INSTALLATION

A. Insulation Application:
1. Mechanically fasten insulation to deck
2. Place second layer of insulation with joints staggered minimum 6 inches from joints of first layer
3. Mechanically fasten boards over roof surface
4. Place eight fasteners per insulation board or minimum of 24 inches on center
5. Place constant thickness first layer and tapered thickness insulation second layer to required slope pattern
6. Minimum Total Insulation Thickness: 8 inch
7. Place boards perpendicular to deck flutes with edges over flute surface for bearing support
8. Lay boards with edges in moderate contact without forcing
9. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof
10. Cut boards to slope for distance of 18 inches back from roof drains for positive drainage
11. Apply no more insulation than can be covered with membrane in same day.
12. Tape joints of insulation

B. Membrane Application:
1. Apply membrane and mechanical attachment devices
2. Install mechanical fasteners at along the edge of the membrane through the insulation and into the roof deck
3. Roll out membrane, free from wrinkles or tears
4. Place sheet into place without stretching
5. Overlap edges and ends and seal by heat welding, minimum 3 inches
6. Seal permanently waterproof. Apply uniform bead of sealant to joint edge
7. Shingle joints on sloped substrate in direction of drainage
8. Apply joint tape and seal
9. Extend membrane up minimum of8 inches onto vertical surfaces
10. Seal membrane around roof penetrations

C. Flashings And Accessories:
1. Apply flexible flashings to seal membrane to vertical elements
2. Secure to nailing strips at 4 inches oc and reglets
3. Coordinate installation of roof drains and related flashings.

4. Seal flashings and flanges of items penetrating membrane
5. Install walkway pads
6. Space pad joints as recommend by roofing manufacturer

3.3 FIELD QUALITY CONTROL

A. Section 01 77 00 – Closeout Procedures: Field inspecting, testing, adjusting, and balancing

B. Require site attendance of roofing materials' manufacturers to inspect roofing installation prior to substantial completion

3.4 CLEANING

A. Section 01 77 00 – Closeout Procedures: Final cleaning

B. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions

C. Repair or replace defaced or disfigured finishes caused by Work of this section

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protection of installed construction

B. Protect building surfaces against damage from roofing work

C. Where traffic must continue over finished roof membrane, protect surfaces

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Flashings and counterflashings
2. Fascia and soffit
3. Fabricated sheet metal items
4. Reglets and accessories

B. Related Sections:
1. Section 07 53 05 - Elastomeric Membrane Roofing - Mechanical Attached
2. Section 07 72 33 - Roof Hatches: Metal curbs
3. Section 07 90 00 - Joint Protection
4. Section 09 90 00 - Painting and Coating: Field painting

1.2 REFERENCES

A. American Architectural Manufacturers Association:
1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum
2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
3. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
4. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels

B. ASTM International:
1. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
2. ASTM A625/A625M - Standard Specification for Tin Mill Products, Black Plate, Single Reduced
3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
4. ASTM A755/A755M - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Pre-painted by the Coil-Coating Process for Exterior Exposed Building Products
5. ASTM B32 - Standard Specification for Solder Metal
6. ASTM B101 - Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction
7. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
8. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction
9. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and

Plate Products
10. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
11. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
12. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free

C. Copper Development Association Inc.:
1. CDA - Copper in Architecture - Handbook

D. Federal Specification Unit:
1. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant

E. Sheet Metal and Air Conditioning Contractors:
1. SMACNA - Architectural Sheet Metal Manual

1.3 DESIGN REQUIREMENTS

A. Sheet Metal Flashings: Conform to the following criteria of SMACNA "Architectural Sheet Metal Manual"

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details

C. Product Data: Submit data on manufactured components metal types, finishes, and characteristics

D. Samples:
1. Submit two samples illustrating metal finish color

1.5 QUALIFICATIONS

A. Fabricator and Installer: Company specializing in sheet metal work with minimum three years documented experience

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation
1. Slope metal sheets to ensure drainage

C. Prevent contact with materials causing discoloration or staining

1.7 COORDINATION

A. Section 01 31 00 – Project Management and Coordination

B. Coordinate installation of recessed flashing reglets with other section

PART 2 - PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

A. Galvanized Steel: ASTM A653/A653M; structural steel sheet, G90 zinc coating; 0.024 inch

thick steel

B. Pre-Finished Galvanized Steel Sheet: ASTM A755/A755M; structural steel sheet, G90 zinc coating; 0.024 inch thick core steel, shop pre-coated with silicone polyester or two coat fluoropolymer top coat; color as selected from manufacturer's standard color as selected
   1. Compatible with the roofing membrane manufacturer warranty

2.2 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers

B. Primer: Zinc molybdate or type

C. Protective Backing Paint: Zinc molybdate alkyd or FS TT-C-494, Bituminous

D. Sealant: Compatible with flashing and metal trim materials

E. Plastic Cement: ASTM D4586, Type I

F. Reglets: Recessed type, galvanized steel or rigid extruded PVC; face and ends covered with plastic tape

G. Solder: ASTM B32; type suitable for application and material being soldered

2.3 FABRICATION

A. Form sections shape indicated on Drawings, accurate in size, square, and free from distortion or defects

B. Fabricate cleats of same material as sheet metal, interlocking with sheet

C. Form pieces in longest possible lengths

D. Hem exposed edges on underside 1/2 inch; miter and seam corners

E. Form material with flat lock seams, except where otherwise indicated
   1. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams

F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant

G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip

H. Fabricate flashings to allow toe to extend 2 inches over roofing
   1. Return and brake edges

I. Seal metal joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution

B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located

C. Verify roofing termination and base flashings are in place, sealed, and secure

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation

B. Install surface mounted reglets to lines and levels indicated on Drawings
   1. Seal top of reglets with sealant

C. Paint concealed metal surfaces with protective backing paint to minimum dry film thickness of 15 mil

3.3 INSTALLATION

A. Insert flashings into reglets to form tight fit
   1. Secure in place with lead or plastic wedges
   2. Seal flashings into reglets with sealant

B. Secure flashings in place using concealed fasteners
   1. Use exposed fasteners only where permitted

C. Apply plastic cement compound between metal flashings and felt flashings

D. Fit flashings tight in place

E. Make corners square, surfaces true and straight in planes, and lines accurate to profiles

F. Seal metal joints watertight

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing

B. Inspection will involve surveillance of Work during installation to ascertain compliance with specified requirements

END OF SECTION

SECTION 07 71 00

ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes copings

B. Related Sections:
1. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings

1.2 REFERENCES

A. ASTM International:
1. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free

B. National Roofing Contractors Association:
1. NRCA - The NRCA Roofing and Waterproofing Manual

C. Sheet Metal and Air Conditioning Contractors:
1. SMACNA - Architectural Sheet Metal Manual

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work

C. Product Data: Submit data on shape of components, materials and finishes, anchor types and locations

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA or NRCA details

1.5 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds

B. Furnish five year manufacturer warranty for roof finish

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Copings: metal compatible with roofing materials, shaped as indicated on Drawings
1. Include cover plates to conceal and weather seal joints and attachment flanges

2.2 ACCESSORIES

A. Sealant: Manufacturer's standard type suitable for use with installation of system; non-staining, non-skinning, non-shrinking, and non-sagging; color as selected

B. Roofing Cement: ASTM D4586, Type I or II, cutback asphalt type

2.3 FINISHES

A. Pre-Coated Galvanized Steel: Color as selected

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Verify deck, curbs, roof membrane, base flashing, and other items affecting Work of this section are in place and positioned correctly

3.2 INSTALLATION

A. Conform to SMACNA - Architectural Sheet Metal Manual or NRCA - Waterproofing Manual drawing details

B. Coordinate installation of components of this section with installation of roofing membrane and base flashings

C. Coordinate installation of sealants and roofing cement with Work of this section to ensure water tightness

D. Coordinate installation of flashing flanges into reglets

END OF SECTION

SECTION 07 72 33

ROOF HATCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Prefabricated roof hatches, with integral support curbs, operable hardware, and counterflashings

B. Related Sections:
   1. Section 06 10 00 - Rough Carpentry: Wood framing for rough opening
   2. Section 07 53 05 - Elastomeric Membrane Roofing - Mechanical Attached
   3. Section 07 62 00 - Sheet Metal Flashing and Trim: Flashing to roof system
   4. Section 09 90 00 - Painting and Coating: Field painting

1.2 PERFORMANCE REQUIREMENTS

A. Hatches to withstand live loads as calculated in accordance with applicable code

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit data on unit construction, sizes, configuration, jointing methods and locations when applicable, and attachment method

PART 2 - PRODUCTS

2.1 ROOF HATCHES

A. Manufacturers:
   1. Babcock-Davis
   2. Bilco Company
   3. Dur-Red Products
   4. Metallic Products Corp
   5. Substitutions: Section 01 60 00 - Product Requirements

B. Product Description: Manufacturer's standard zinc-coated steel, with nominal12 inch high integral curb, double-wall insulated type
   1. Roof Hatches:
      a. Single Leaf Personnel Access: 2’-6" x 3'-0" ladder access

2.2 COMPONENTS

A. Integral Steel Curb: Minimum 14 gage galvanized or prime painted steel with nominal 1 inch rigid glass fiber or foam insulation; integral cap flashing to receive roof flashing; extended flange for mounting

B. Flush Steel Cover: Minimum 14 gage galvanized or prime painted steel; nominal 1 inch glass fiber or foam insulation; minimum 22 gage steel interior liner; continuous neoprene gasket to provide weatherproof seal

C. Hardware: Manufacturer's standard finish:
   1. Compression spring operator and shock absorbers
   2. Steel manual pull handle for interior operation
   3. Steel hold open arm with vinyl covered grip handle for easy release
   4. Padlock hasp
   5. Hinges: Manufacturer's recommended type for specific type of roof hatch
   6. Roof Hatch safety railing system on (3) sides of hatch in High Visibility Safety Yellow
      a. Posts and rails: 1 ¼" Schedule 40 pipe in 6061 T6 Aluminum Alloy
      b. Satisfy OSHA 29 CFR 1910.29 and OSHA Strength Requirements
      c. Provide gate in safety railing with pin latching mechanism.
      d.

2.3 ACCESSORIES

A. Anchorage Devices: Type recommended by manufacturer

B. Counterflashings: Same metal type and finish as roof hatch frame

C. Protective Coating: Zinc molybdate alkyd or Bituminous, FS TT-C-494

D. Sealant: Manufacturer's recommended sealants integral with roof hatch installation non-hardening, non-skinning, non-drying, non-migrating butyl based sealants

2.4 FABRICATION

A. Fabricate components free of visual distortion and free of defects. Weld corners and joints

B. Provide for condensation occurring within components and within assembly to drain to exterior above roofing

C. Fit components for weather tight assembly

D. Sloped Roofs: Fabricate roof hatch curbs tapered to maintain hatch top level

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Verify openings and substrate conditions are ready to receive Work of this section

3.2 PREPARATION

A. Apply protective coating on aluminum surfaces of roof hatches to be in contact with cementitious materials or dissimilar metals

3.3 INSTALLATION

A. Install curb assembly, fastening securely to roof structure. Flash curb assembly into roof system

B. Place roof hatch and secure to curb assembly. Install integral setting sealant and counterflashing as required

C. Final installation to be watertight assembly

D. Coordinate with installation of roofing system and related flashings for weather tight installation

E. Apply bituminous paint on surfaces of units in contact with cementitious materials or dissimilar metals

F. Adjust hinges for smooth operation

3.4 FIELD QUALITY CONTROL

A. Section 01 77 00 - Closeout Procedures: Field inspecting, testing, adjusting, and balancing

3.5 CLEANING

A. Section 01 77 00 - Closeout Procedures: Final cleaning

B. Wash down exposed surfaces; wipe surfaces clean.

C. Remove excess sealant

END OF SECTION

SECTION 07 90 00

JOINT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Sealants
2. Joint backing
3. Pre-compressed foam sealers
4. Accessories

1.2 REFERENCES

A. ASTM International:
1. ASTM C834 - Standard Specification for Latex Sealants
2. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications
3. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
4. ASTM C1193 - Standard Guide for Use of Joint Sealants
5. ASTM D1056 - Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber
6. ASTM D1667 - Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam)
7. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience

B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation

1.6 COORDINATION

A. Section 01 73 00 - Execution

B. Coordinate Work with other section requirements

PART 2 - PRODUCTS

2.1 JOINT SEALERS

A. Manufacturers:
1. BASF Building Systems
2. DAP Products Inc
3. Dow Corning Corporation
4. Sika Corporation
5. Tremco Incorporated
6. Substitutions: Section 01 60 00 - Product Requirements

B. Products Description:
1. High Performance General Purpose Exterior (Non-traffic) Sealant: Silicone, Polyurethane, or Polysulfide; ASTM C920, Grade NS, Class 25, Uses M, G, and A; single or multi- component
   a. Color: Standard colors matching finished surfaces
   b. Applications: Use for:
      1) Control, expansion, and soft joints in masonry
      2) Joints between concrete and other materials
      3) Joints between metal frames and other materials
      4) Other exterior non-traffic joints for which no other sealant is indicated
2. General Purpose Exterior (Non-traffic) Sealant: Acrylic, solvent release curing; ASTM C920, Grade NS, Class 12-1/2, Uses M, G, and A; single or multi-component
   a. Color: Standard colors matching finished surfaces
   b. Applications: Use for:
      1) Control, expansion, and soft joints in masonry
      2) Joints between concrete and other materials
      3) Joints between metal frames and other materials
      4) Other exterior non-traffic joints for which no other sealant is indicated
3. Exterior Foam Expansion Joint Sealer: Pre-compressed foam sealer; Polyurethane with water-repellent
   a. Color: Face color as selected
   b. Size: As required to provide weathertight and watertight seal when installed
   c. Applications: Use for exterior wall expansion joints
4. Exterior Compressible Gasket Expansion Joint Sealer: ASTM D2628, hollow neoprene (Polychloroprene) compression gasket
   a. Color: Black color
   b. Size and Shape: As indicated on Drawings
   c. Applications: Use for exterior wall expansion joints
5. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, non-drying, non-skinning, non-curing
   a. Applications: Use for concealed sealant bead in sheet metal work and concealed sealant bead in siding overlaps
6. Weather Barrier Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.

7. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board
8. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, single component, paintable
    a. Color: Colors as selected
    b. Applications: Use for interior wall and ceiling control joints, joints between door and window frames and wall surfaces, and other interior joints for which no other type of sealant is indicated
9. Bathtub/Tile Sealant: White silicone; ASTM C920, Uses M and A; single component, mildew resistant
    a. Applications: Use for joints between plumbing fixtures and floor and wall surfaces, and joints between kitchen and toilet room counter tops and wall surfaces

2.2 ACCESSORIES

A. Expansion Joint Cover
    1. CS Expansion Joint Covers (Or Similar)
        a. Model SF 200/600 Series
        b. Single Durometer: 70 Shore A, ASTM D2000
        c. Color: #136 Gray
        d. Brittle Point: -76°F
        e. Ozone Resistance: No Cracks, ASTM D1149
        f. UV Resistance: Very Good

B. Primer: Non-staining type, recommended by sealant manufacturer to suit application

C. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials

D. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width

E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Verify substrate surfaces and joint openings are ready to receive work

C. Verify joint backing and release tapes are compatible with sealant

3.2 PREPARATION

A. Remove loose materials and foreign matter impairing adhesion of sealant

B. Clean and prime joints

C. Perform preparation in accordance with ASTM C1193

D. Protect elements surrounding Work of this section from damage or disfiguration

3.3 INSTALLATION

A. Perform installation in accordance with ASTM C1193

B. Perform acoustical sealant application work in accordance with ASTM C919

C. Measure joint dimensions and size joint backers to achieve the following , unless otherwise indicated:
   1. Width/depth ratio of 2: 1
   2. Neck dimension no greater than 1/2 of joint width
   3. Surface bond area on each side not less than 75 percent of joint width

D. Install bond breaker where joint backing is not used

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags

F. Apply sealant within recommended application temperature ranges
   1. Consult manufacturer when sealant cannot be applied within these temperature ranges

G. Tool joints concave

H. Pre-compressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface

I. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface

3.4 CLEANING

A. Section 01 77 00 – Closeout Procedures: Final cleaning

B. Clean adjacent soiled surfaces

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protection of installed construction

B. Protect sealants until cured

END OF DIVISION

30 YEAR
GUARANTY FOR SINGLE-PLY ROOFING

WHEREAS,_____, corporation whose address is _____, hereinafter called the Manufacturer, has manufactured and sold and caused to have applied, pursuant to the specifications and inspection, the necessary roofing materials to construct a _____ roof of approximately_____ square feet, and associated roof flashing of approximately _____ linear feet on the building described below:

OWNER: State of Idaho, Division of Public Works

DPW PROJECT NO:_____

BUILDING:_____

LOCATION:_____

DATE OF COMPLETION OF ROOFING: _____, 20_____,

ROOFING CONTRACTOR: _____

ADDRESS: _____

ROOFING SPECIFICATION:_____

MANUFACTURER'S GUARANTEE NO: _____

AND WHEREAS, by careful examination of said roof by the Manufacturer's representative, it has been determined that required quantities of roofing materials have been used and that roofing materials have been applied in conformance with contract documents;

AND WHEREAS, Manufacturer represents and wishes to guarantee, subject to the limits stated herein, that its roofing when so applied is effectively watertight for a period of **thirty (30) years** despite normal wear and tear by the elements, as well as guaranteeing it against defects in workmanship or materials; which result in leaks.

NOW THEREFORE, said Manufacturer guarantees to the said Owner that, as set forth below, during a period of **thirty (30) years** from the date of substantial completion of said single-ply roofing described above, Manufacturer will at its own expense, make or cause to be made, any repairs that may be necessary, as a result of defects in workmanship or materials supplied by the Manufacturer which results in leaks or of normal wear and tear by the elements which results in leaks, and will maintain said roof in water tight condition free from all leaks arising from such causes. For purposes of this Guaranty, damage to the roof caused by hurricanes, lightning, tornadoes, gales, hailstorms or other unusual natural phenomena shall not be deemed to be "normal wear and tear by the elements".

INCLUSIONS: This Guaranty does cover, and Manufacturer shall be liable for the following:

1. Roofing membrane, membrane flashings, metal flashings, mechanical fastening system, anchors, adhesives, seaming materials, slip sheets, fabrics, insulations, underlayments, and accessories furnished by the Manufacturer as incorporated into the roof membrane system.

2. Replacement of roof insulation and vapor barrier damages by any leakage and/or failure of the roof membrane assembly;

3. Repair of blisters, buckles, splits, breaks, cracks, and seam failures in membrane system.

EXCLUSIONS: This Guaranty does not cover, and Manufacturer shall not be liable for the following:

1. Metal work, including metal counter flashings, not a part of the roof membrane system and such damage as may result from application of these materials;

2. Any damage to the roof caused by structural defect in, or failure of, the building or defects in, or failure of, any structural roof deck, or other sheathing materials, used as the base over which the roof and roof insulation is applied;

3. Roof damage from special chemical conditions not disclosed to Manufacturer;

4. Any damage to the building or contents thereof, except replacement of damaged roof insulation and vapor barrier as noted under "INCLUSION" above;

5. Roof damage through use of materials after original installation not furnished by Manufacturer;

6. Damage to the roof due to mechanical abrasion or abuse not caused by the Manufacturer.

7. Reasonable care and maintenance will be the responsibility of the Owner.

INSPECTION AND REPAIR: During the term of this Guarantee, Manufacturer, its agents or employees, shall have free access to the roof during regular business hours. Upon written notice by Owner to Manufacturer within four days of the discovery of any leaks in the roofing system,

or need of repair of roof, the Manufacturer shall have ten (10) days to inspect the roof. Following such inspection:

1. Manufacturer, at its own expense shall make such repairs to thereof as are required by the Guaranty.

2. In case owner or his agent has notified Manufacturer in writing that repairs are required and such repairs are not covered by the Guaranty (including repairs required by owner's alteration, extension or addition to the roof) Owner, after having obtained Manufacturer's consent thereto, in writing, shall make or cause to be made, such repairs at Owner's expense in accordance with specifications and procedures as established by Manufacturer and this Guaranty shall thereupon remain in effect for the un-expired portion of its original term. If Owner fails to obtain authorization from Manufacturer or if repairs are made by one other than the Manufacturer's authorized designee, this Guaranty with respect to such area shall be automatically terminated.

3. In the event the (1) Owner notifies Manufacturer and has confirmed in writing the need of repair of roof and (2) Manufacturer is unable to promptly inspect and repair same, and (3) an emergency condition exists which requires prompt repair in order to avoid substantial damage to owner, then owner may make such temporary repairs as may be essential and any such action shall not be a breach of the provision of this Guaranty. Owner will bear emergency repair expenses.

INSPECTION SERVICE: Manufacturer agrees to re-inspect the completed roof not earlier than 12 nor later than 24 months after completion of the roofing, and if it is determined that there are leaks in the roofing, then Manufacturer shall make, or cause to be made at its own expense, such repairs as are necessary in the opinion of the Manufacturer, to assure watertight integrity of the roof within the scope of its' responsibility under the terms of this Guaranty.

IN WITNESS WHEREOF, Manufacturer has caused this instrument to be signed and sealed by its duly authorized officer this _____ day of_____, 20____.

BY:_____

TITLE:_____

CORPORATION:_____

SEAL:

_____
Pat Donaldson, Administrator
Division of Public Works

5 YR
ROOFING WARRANTY

WHEREAS_____

of (Address) _____

herein called the "Roofing Contractor", has performed roofing and associated ("work") on following project:

Owner: _____

DPW PROJECT NO:_____

Address: _____

Name and Type of Building: _____

Address: _____

Area of Work: _____ Date of Acceptance: _____

Warranty Period: Five (5) years Date of Expiration: _____

AND WHEREAS Roofing Contractor has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period.

NOW THEREFORE Roofing Contractor hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work, and as are necessary to maintain said work in watertight condition. In addition to making the work watertight, the Roofing Contractor shall remove and/or repair blisters, ridges, flashings, splits and other irregularities which in the opinion of the Roofing Manufacturer's technical representative do not conform to acceptable roofing practices and conditions. These repairs shall be made prior to expiration of the five (5) year Warranty Period and to the satisfaction of the Roofing Manufacturer's technical representative.

This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by: a) lightning, windstorm; b) fire; c) failure of roofing system substrate including cracking, settlement, excessive deflection, deterioration, and decomposition; d) faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work; and e) activity on roofing by others including construction contractors, maintenance personnel, other persons, and animals whether authorized or unauthorized by Owner.

When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Contractor, and until cost and expense thereof has been paid by Owner or by another responsible party so designated.

2. The Roofing Contractor is responsible for damage to work covered by this Warranty, but is not liable for consequential damages to building or building contents, resulting from leaks or faults or defects of work.

3. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Contractor, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void upon date of said alterations, but only to extent said alterations affect work covered by this Warranty. If Owner engages Roofing Contractor to perform said alterations, Warranty shall not become null and void, unless Roofing Contractor, prior to proceeding with said work, shall claim that said alterations would like damage or deteriorate work, thereby reasonably justifying a limitation or termination of this warranty.

4. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void upon date of said change, but only to extent said change affects work covered by this Warranty.

5. The Owner shall promptly notify Roofing Contractor of observed, known or suspected leaks, defect or deterioration, and shall afford reasonable opportunity for Roofing Contractor to inspect work, and to examine evidence of such leaks, defects or deterioration.

6. This Warranty is recognized to be the only Warranty of Roofing Contractor on said work, and is in addition to the Roofing Guarantee furnished by the Roofing Manufacturer, and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to him in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Contractor of responsibility for performance of original work in accordance with requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this

_____day of _____, 20_____

Cosigned by General Contractor by:

_____	_____
(General Contractor)	(Roofing Contractor)
_____	_____
(Business Address)	(Business Address)
_____	_____
(Signature)	(Signature)
_____	_____
(Title)	(Title)

DIVISION 08 OPENINGS

SECTION 08 12 14

STANDARD STEEL FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes steel door frames.

B. Related Sections:
1. Section 08 13 14 - Standard Steel Doors.
2. Section 08 71 00 - Door Hardware: Hardware, silencers, and weatherstripping.
3. Section 08 80 00 - Glazing.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.

B. ASTM International:
1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.

C. Product Data: Submit frame configuration and finishes.

1.4 QUALITY ASSURANCE

A. Conform to requirements of ANSI A250.8.

B. Attach label from agency approved by authority having jurisdiction to identify each fire rated door frame.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept frames on site in manufacturer's packaging. Inspect for damage.

C. Break seal on-site to permit ventilation.

1.7 COORDINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Coordinate Work with frame opening construction, door, and hardware installation.

C. Sequence installation to accommodate required door hardware electric wire connections.

PART 2 PRODUCTS

2.1 STANDARD STEEL FRAMES

A. Manufacturers:
1. Amweld Building Products, Inc.
2. Ceco Door Products Model.
3. Republic Builders Products.
4. Steelcraft.
5. Curries.
6. Substitutions: Section 01 60 00 - Product Requirement.

B. Product Description: Standard shop fabricated steel frames, non-rated types.
1. Frames: To suit ANSI A250.8 Grade and Model of door specified in Section 08 13 14 and 08 14 16.
2. Exterior Frames:
   a. Level 3 for Door Models 1, nominal 16 gage/0.053 inch thick material, base metal thickness.
3. Interior Frames:
   a. Level 3 for Door Models 1, nominal 16 gage/0.053 inch thick material, base metal thickness.

2.2 ACCESSORIES

A. Primer: ANSI A250.10 rust inhibitive type.

B. Silencers: Resilient rubber set in steel fitted into drilled hole.

C. Weatherstripping: Specified in Section 08 71 00.

2.3 FABRICATION

A. Fabricate frames as welded unit for gypsum board slip on type, except for exterior.

B. Fabricate frames with hardware reinforcement plates welded in place.

C. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

D. Prepare frames for silencers. Provide three single silencers for single doors on strike side. Provide two single silencers on frame head at double doors without mullions.

E. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

2.4 SHOP FINISHING

A. Steel Sheet: Galvanized to ASTM A653/A653M A60.

B. Primer: Baked.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install frames in accordance with ANSI A250.8.

B. Coordinate with gypsum board wall construction for anchor placement.

C. Coordinate installation of glass and glazing specified in Section 08 80 00.

D. Coordinate installation of frames with installation of hardware specified in Section 08 71 00 and doors in Section 08 13 14 and 08 14 16.

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.4 SCHEDULE

A. Refer to Door Schedule.

END OF SECTION

SECTION 08 13 14

STANDARD STEEL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes non-rated thermally insulated steel doors

B. Related Sections:
   1. Section 08 12 14 - Standard Steel Frames
   2. Section 08 71 00 - Door Hardware
   3. Section 08 80 00 - Glazing: Glass for doors
   4. Section 09 90 00 - Painting and Coating: Field painting of doors

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames

B. ASTM International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
   2. ASTM C1363 - Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

C. Hollow Metal Manufacturers Association:
   1. HMMA 810 - Hollow Metal Doors

D. Steel Door Institute:
   1. SDI 108 - Recommended Selection and Usage Guide for Standard Steel Doors

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for glazing, and finishes

C. Product Data: Submit door configurations, location of cut-outs for hardware reinforcement

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI A250.8

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Protect doors with resilient packaging sealed with heat shrunk plastic

C. Accept doors on site and inspect for damage

D. Break seal on site to permit ventilation

1.7 COORDINATION

A. Section 01 73 00 - Execution: Requirements for coordination

B. Coordinate Work with door opening construction, door frame, and door hardware installation

C. Coordinate installation to accommodate door hardware electric wire connections

PART 2 - PRODUCTS

2.1 STANDARD STEEL DOORS

A. Manufacturers:
1. Amweld International, LLC
2. Ceco Door
3. Curries Company
4. Republic Doors and Frames
5. Steelcraft
6. Substitutions: Section 01 60 00 - Product Requirements

B. Product Description:
1. Exterior Doors (Insulated): ANSI A250.8, SDI 108, 1-3/4 inch thick
   a. Level 3 - Extra heavy Duty, Model 1, full flush design
2. Interior Doors (Non-Rated): ANSI A250.8, SDI 108, 1-3/4 inch thick
   a. Level 3 - Extra heavy Duty, Model 1, full flush design

2.2 COMPONENTS

A. Face: Steel sheet in accordance with ANSI A250. SDI 108

B. End Closure: Channel, 0.04 inches thick, flush

C. Core:
1. Exterior doors: polyurethane and vertical steel stiffeners
2. Interior doors: steel channel grid and vertical steel stiffeners

D. Thermal Insulated Door: Total insulation R-Value of 14, measured in accordance with ASTM C1363

2.3 ACCESSORIES

A. Removable Stops: Rolled steel, channel shape, mitered corners; prepared for countersink style tamper proof screws

B. Astragals for Double Doors: Steel, T shaped, specifically for double doors

C. Primer: ANSI A250.10 rust inhibitive type

2.4 FABRICATION

A. Fabricate doors with hardware reinforcement welded in place

2.5 SHOP FINISHING

A. Steel Sheet: Galvanized to ASTM A653/A653M A60
B. Primer: Baked
C. Field Painted

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work
B. Verify opening sizes and tolerances are acceptable

3.2 INSTALLATION

A. Install doors in accordance with ANSI A250.8
B. Install door louvers, plumb and level
C. Coordinate installation of glass and glazing specified in Section 08 80 00
D. Coordinate installation of doors with installation of frames specified in Section 08 12 14 and hardware specified in Section 08 71 00
E. Touch-up damaged shop finishes

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances
B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner

3.4 ADJUSTING

A. Section 01 77 00 – Closeout Procedures: Requirements for adjusting
B. Adjust door for smooth and balanced door movement

3.5 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes flush wood doors; flush and flush glazed configuration; non-rated.

B. Related Sections:
1. Section 08 12 14 - Standard Steel Frames.
2. Section 08 71 00 - Door Hardware.
3. Section 08 80 00 - Glazing.
4. Section 09 90 00 - Painting and Coating

1.2 REFERENCES

A. Architectural Woodwork Institute:
1. AWI - Quality Standards Illustrated.

B. Hardwood Plywood and Veneer Association:
1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

C. Forest Stewardship Council:
2. FSC Guidelines - Forest Stewardship Council Guidelines.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, and special blocking for hardware, factory machining criteria, identify cutouts for glazing.

C. Product Data: Submit information on door core materials and construction, and on veneer species, type and characteristics.
1. Submit two samples of door veneer, 6 x 6 inch in size illustrating wood grain, stain color, and sheen.

D. Manufacturer's Installation Instructions: Submit special installation instructions.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with AWI Quality Standard Section 1300, Premium Grade. Finish doors in accordance with AWI Quality Standard Section 1500.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges when stored more than one week.
   1. Break seal on site to permit ventilation.

1.7 COORDINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Coordinate Work with door opening construction, door frame and door hardware installation.

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

C. Furnish manufacturer's "Life of Installation" warranty for interior doors.

PART 2 PRODUCTS

2.1 FLUSH WOOD DOORS

A. Manufacturers:
   1. Masonite
   2. Algoma Hardwoods Inc.
   3. Eggers Industries.
   4. Marshfield Door Systems.
   5. Mohawk Flush Doors, Inc.
   6. Oshkosh Architectural Door Co.
   7. VT Architectural Wood Doors
   8. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Solid core flush wood doors; wood veneer facing material; non-rated types; flush glazed design; factory finished wood doors.
   1. Flush Interior Doors: 1-3/4 inches thick; solid core, seven ply construction

2.2 COMPONENTS

A. Solid Core, Non-Rated: AWI Section 1300, SCL Structural Composite Lumber.

B. Interior Veneer Facing: AWI Custom quality wood, rotary cut, with center balanced match book matched grain, for transparent finish. Pair match multiple door leaves in single opening.
   1. Wood: Oak
   2. Stain Color: Stout

C. Facing Adhesive: Type II - water resistant.

2.3 ACCESSORIES

A. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style screws.

2.4 FABRICATION

A. Fabricate doors in accordance with AWI Quality Standards requirements.

B. Astragals for Double Doors: Treated wood, T shaped, overlapping and recessed at face edge, specifically for double doors.

C. Furnish lock blocks at lock edge and top of door for closer for hardware reinforcement.

D. Vertical Exposed Edge of Stiles: Of same species as veneer facing.

E. Fit door edge trim to edge of stiles after applying veneer facing.

F. Bond edge banding to cores.

G. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Furnish solid blocking for through bolted hardware.

H. Cut and configure exterior door edge to receive recessed smoke seals devices.

I. Provide edge clearances in accordance with AWI 1300.

J. Factory finish wood doors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

A. Install doors in accordance with AWI Quality Standards requirements.

B. Trim non-rated door width by cutting equally on both jamb edges.

C. Trim door height by cutting bottom edges to maximum of 3/4 inch.

D. Machine cut doors for hardware installation.

E. Coordinate installation of doors with installation of frames specified in Section 08 12 14 and hardware specified in Section 08 71 00.

F. Install door louvers plumb and level.

G. Coordinate installation of glass and glazing specified in Section 08 80 00.

H. Site finish doors in accordance with Section 09 90 00.

3.3 INSTALLATION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Conform to AWI requirements for fit and clearance tolerances.

C. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taut string, corner to corner, over imaginary 36 x 84 inches surface area.

D. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over imaginary 36 x 84 inches surface area.

E. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over imaginary 36 x 84 inches surface area.

3.4 ADJUSTING

A. Section 01 77 00 – Closeout Procedures: Testing, adjusting, and balancing.

B. Adjust door for smooth and balanced door movement.

C. Adjust closer for full closure.

3.5 SCHEDULE

A. Refer to Door Schedule on Drawings.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes non-rated access doors and panels with frames.
   1. Provide for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible finished surfaces.
   2. Provide access to concealed space behind finished surfaces, under floors and above ceilings.
   3. Coordinate exact locations with various trades to assure proper placement of access doors and panels.

B. Related Sections:
   1. Section 03 10 00 - Concrete Forming and Accessories: Placement of access frame unit anchors in concrete.
   2. Section 05 40 00 - Cold-Formed Metal framing: Framing for openings and placement of access unit frames anchors.
   3. Section 06 10 00 - Rough Carpentry: Framing for openings and placement of access unit frames anchors.
   4. Section 09 21 16 - Gyspum Board Assemblies: Placement of access frame unit anchors
   5. Section 09 22 16 - Non Structural Metal Framing: Framing for openings and placement of access unit frames anchors.
   6. Section 09 90 00 - Painting and Coating: Field paint finish.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations, fire resistance listings, and details of adjoining Work.

C. Manufacturer's Installation Instructions: Submit installation requirements and rough-in dimensions.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Project Record Documents: Record actual locations of access units.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified with minimum three years documented experience.

1.5 COORDINATION

A. Section 01 73 00 - Execution: Requirements for coordination.

B. Coordinate Work with work for concealed spaces controls, valves, traps, dampers, cleanouts, and similar items being located behind finished surfaces.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND PANELS

A. Manufacturers:
1. Bilco Company.
2. Dur-Red Products.
3. Elmdor/Stoneman Manufacturing Company.
4. Karp Associates, Inc.
5. Milcor.
6. Nystrom, Inc.
7. Substitutions: Section 01 60 00 - Product Requirement.

B. Flush Framed Access Doors (Type 1): Frames and nominal 1 inch wide exposed flanges of 16 gage steel and door panels of 14 gage steel.

C. Gypsum Board Access Doors (Type 2): Frames and nominal 1 inch wide flanges of 16 gage steel and door panels of 14 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09 21 16.

2.2 FABRICATION

A. Fabricate units of continuous welded construction; weld, fill, and grind joints to assure flush and square unit.

B. Wall and Ceiling Access Door and Panel Hardware:
1. Hinge: Standard continuous or concealed spring pin type, 175 degree steel hinges.
2. Lock: Self-latching lock. Screw driver slot for quarter turn cam lock.

C. Size Variations: Obtain acceptance of manufacturer's standard size units which vary slightly from sizes shown or scheduled.

2.3 SHOP FINISHING

A. Manufacturer standard factory finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify rough openings for access doors and panels are correctly sized and located.

3.2 INSTALLATION

A. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face aligned with adjacent finished surfaces.
   1. Set concealed frame type units flush with adjacent finished surfaces.

B. Position unit to provide convenient access to concealed work requiring access.

END OF SECTION

SECTION 08 33 23

OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes insulated overhead coiling doors, operating hardware, motorized operation.
   1. Provide wiring from electric circuit disconnect to door operator to control station.

B. Related Sections:
   1. Section 05500 - Metal Fabrications: Support framing and framed opening.
   2. Section 08 71 00 - Door Hardware: Product Requirements for cylinder core and keys for placement by this section.
   3. Section 09 90 00 - Painting and Coating: Field paint finish.

1.2 REFERENCES

A. ASTM International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   2. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
   3. ASTM B221 - Standard ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

1.3 SYSTEM DESCRIPTION

A. Motorized Operation: Direct drive, integrated gear motor/brake assembly sized for openings. Provide with a manual hand chain for operation during power outages. Operator and drive assembly is factory pre-assembled and provided with all wiring harnesses needed direct from the factory.

1.4 DESIGN REQUIREMENTS

A. Operation: Design shutter assembly to operate for not less than 10,000 cycles.

B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

C. Product Data: Submit general construction, component connections and details Samples: Submit two door slats illustrating shape color and finish texture.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section approved by manufacturer.

PART 2 PRODUCTS

2.1 INSULATED OVERHEAD COILING SHUTTER

A. Manufacturers:
1. Overhead Door Corp. Series 626
2. Cookson Co.
3. Cornell Iron Works, Inc.
4. Raynor Garage Door.
5. Substitutions: Section 01 60 00 - Product Requirements

B. Product Description:
1. Electric Motor Operation with Manual Operation override: Manual push-up (crank) unit with overhead counter balance device, requiring 25 lb nominal force to operate.

C. Curtain: Interlocking roll-formed metal slats as specified with endlocks attached to each end of alternate slats to prevent lateral movement.
1. Flat Profile insulated type F-265i with 24 gauge back covering steel or stainless steel; .024 inch (.06 mm) aluminum, for doors up to 20 feet wide fabricated of:
2. 20 gauge powder coated steel.
3. Insulation: Slat cavity shall be filled with CFC-free, foamed-in-place, polyurethane insulation.
4. R-Value: 7.7, U-Value: 0.13.
5. Sound Rating: STC-21.
6. Slat Finish:
    1. PowderGuard Max powder coat.
        1) Color as selected

D. Bottom Bar: Two metal angles, minimum thickness 3/16 inch, bolted back to back to reinforce curtain in the guides.
   1. Material: Steel.

E. Guides: Three Structural steel angles provided with high usage guide wear strip to minimize wear and reduce sound.
   1. Material: Steel.

F. Brackets:
   1. Hot rolled prime painted steel to support counterbalance, curtain and hood.

G. Finish; Bottom Bar, Guides, Headplate and Brackets:
   1. PowderGuard Max powder coat color as selected

H. Motor: Direct drive, integrated gear motor/brake assembly sized for openings. Provide with a manual hand chain for operation during power outages. Operator and drive assembly is factory pre-assembled and provided with all wiring harnesses needed direct from the factory.
   1. Opening Speed: Up to 24 inches per second.
   2. Closing Speed: 12 inches per second.
   3. Supply Voltage: 230V AC, 3-phase, operating range 208/245V.
   4. Coordinate electrical connections and mounting with electrical drawings

I. Control Panel: Provide electronic Variable Frequency drive controller with microprocessor self-diagnostics. LCD readout indicates door action, alarm conditions, and fault conditions. Timer to close programming options and non- resettable cycle counter are included. Enclosure is NEMA 4X rated. Control system is UL508A certified. Junction box is IP67 rated.

J. Door Roll: Directly driven, springless roll shall be steel tube with integral shafts, keyed on the Drive End and supported by self-aligning greaseable sealed bearings. Door shall not require any counterbalance device.

K. Hood: Protecting drive motor, barrel, chain, and sprocket from dirt and debris and extending between the support brackets. Fabricated of:
   1. Material: Steel.
      a. PowderGuard Premium powder coat, color as selected

L. Safety Devices: Provide door with following safety devices:
   1. Built-in (to motor assembly) brake mechanism eliminates uncontrolled curtain travel independent of other safeties.

M. Actuators: One Open/Close/Stop push button station incorporated into Control Panel
   1. Radio control.

N. Wind Load Design: Standard wind load shall be 20 PSF.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify opening sizes, tolerances and conditions are acceptable.

3.2 INSTALLATION

A. Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly, brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.

F. Install perimeter trim and closures.

G. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maintain dimensional tolerances and alignment with adjacent Work.

C. Maximum Variation From Plumb: 1/16 inch.

D. Maximum Variation From Level: 1/16 inch.

E. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.4 ADJUSTING

A. Section 01 77 00 – Closeout Procedures: Testing, adjusting, and balancing.

B. Adjust shutter, hardware and operating assemblies for smooth and noiseless operation.

C. Test smoke activated assemblies for proper activation.

3.5 CLEANING

A. Section 01 77 00 – Closeout Procedures: Final cleaning.

B. Clean Shutter and components.

C. Remove labels and visible markings.

END OF SECTION

SECTION 08 36 13

SECTIONAL DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes electric overhead sectional door and operating hardware,

1.2 REFERENCES

A. ASTM International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   2. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
   3. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

B. Door and Access Systems Manufacturers Association International:
   1. DASMA 102 - Specifications for Sectional Overhead Type Doors.

C. National Electrical Manufacturers Association:
   1. NEMA MG 1 - Motors and Generators.

D. National Fire Protection Association:
   1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

E. Underwriters Laboratories Inc.:
   1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

A. Panels: Flush steel, insulated.

B. Lift Type: High lift operating style with lift clearance track and hardware.

C. Operation: Electric.

D. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall to design pressure of 20 lb/sq ft.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Product Data: Submit component construction, anchorage method, and hardware.

D. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout procedures.

B. Operation and Maintenance Data:
   1. Include electrical control adjustment recommendations.
   2. Include data for motor and transmission, shaft and gearing, lubrication frequency, periodic adjustments required, and spare part sources.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with DASMA 102, Application Type Commercial.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified.

C. Surface Burning Characteristics:
   1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with NFPA 255 UL 723.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience approved by manufacturer.

1.8 WARRANTY

A. Section 01 77 00 – Closeout Procedures: Submittal of Product Warranties.

B. Furnish five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.1 SECTIONAL OVERHEAD DOORS

A. Manufacturers:
   1. Raynor Garage Door.
   2. American Garage Door Supply Inc.
   3. Overhead Door.
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Steel overhead sectional doors, electric operation, stock configuration and hardware.
   1. Door Nominal Thickness: 3 inches thick.

2.2 DOOR OPERATOR

A. Provide doors designed for manual and electric motor operation.
   1. Door 126B Shall be manual operation only, exclude electric operator

B. Manufacturer Product Designation:
   1. Raynor Control Hoist 2.0 Optima:
   2. Type: Jackshaft

3. Motor Horsepower Rating: Continuous HP as determined by manufacturer for size of door.
4. Electrical Requirements: 115 Volt Single Phase.
5. Duty Cycle: 30 cycles/hour.
6. Control Wiring: 24 volt control with provisions for connection of safety edge to reverse and external radio control hook-up. Three button momentary contact "open-close-stop".

C. Wire Doors to open independently and together.

2.3 DOOR SECTIONS

A. Material: Steel sandwich construction, 3 inches (76.2 mm) thick, roll from commercial quality, hot-dipped galvanized steel ASTM A 924 and ASTM 653. Exterior and interior section skins to be constructed of 25 gauge steel (0.017 inch minimum thickness) embossed stucco texture, mechanically interlocked and pressure bonded to a 2-7/8 inches (73 mm) thick, extruded polystyrene closed cell foam core. Hinge reinforcement plates shall be of 14 gauge edge plates and 16 gauge center plates, located within section interior at every hinge location. End stiles to be 14 gauge, separated from the exterior skin by a vinyl thermal break.

B. Mounting: Sections mounted in door opening using Lap Jamb Angel Mounting: section overlap door jambs by 1 inch (25 mm) on each side of door opening Between-Jamb Bracket Mounting: sections mounted between door jambs, seal against perimeter seal installed along vertical and top horizontal edges of jambs.

C. Insulation: Extruded polystyrene closed cell foam core, R-value of 16.0 and U-valve of 0.062.

D. Seals: Interior and exterior skins to be separated by continuous dual durometer vinyl seal held in place by mechanical interlock to form thermal break and complete weatherseal along section joint. Top of door to be provided with EPDM rubber sealing strip. Bottom of door to have flexible U-shape vinyl seal retained in aluminum rail.

E. Trussing: Floors designed to withstand specified windload. Deflection of door in horizontal position to be maximum of $1/120^{th}$ of door width.

F. Color: Exterior skin to have two coats of paint, one primer coat and one finish coat. Color as selected by architect from manufacturer full range of colors.

G. Windows: Locations to comply with door elevation drawings. 36 inches by 14 inches full view (square –edge) window encased in an extruded PVC frame where shown on drawings.

H. Glazing: Windows to be provided with 5/8 inch (16 mm) thick insulated glazing units as follows:
1. Acrylic consisting of two panes of 1/8 inch (3.2 mm) thick acrylic Plexiglass.

2.4 TRACK

A. Material: Hot-dipped galvanized steel (ASTM A-653), fully adjustable for adequate sealing of door to jamb or weatherseal.

B. Configuration Type: Lift-Standard

C. Size: 3 inches.

D. Mounting: Floor-to-Shaft Angle-Mount consisting of continuous angle extending from the floor, past header, completely up to door shaft for use with steel, wood, or masonry jambs. Continuous angle size not less than 2-5/16 inches by 5 inches x 3/32 inch on 2-inch track.

E. Finishing: White, powder coat.

2.5 COUNTERBALANCE SYSTEM

A. Type: Provided with aircraft-type, galvanized steel lifting cables with minimum safety factor of 5. Torsion Springs consisting of heavy-duty oil-tempered wire torsion springs on a continuous ball-bearing cross-header shaft, Weight Counterbalance for lift clearance and vertical lift type configurations.

2.6 HARDWARE

A. Hinges and Brackets: Fabricated from galvanized steel.

B. Track Rollers: 3 inches diameter consistent with track size, with hardened steel ball bearings.

C. Perimeter Seal: Provide complete weather stripping systems to reduce air infiltration. Weather stripping shall be replaceable without removal of track, mounting hardware, or door hardware. For bracket mounted doors provide climate seal or vinyl seal with aluminum retainer.

D. Locks: Furnish door system with exterior lock key to building keying system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 – Execution: Examination of existing conditions.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

3.2 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor retarder seal.

3.3 INSTALLATION

A. Anchor assembly to wall construction and building framing without distortion or stress.

B. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

C. Fit and align door assembly including hardware.

D. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.

F. Install perimeter weatherstripping.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 1/16 inch.

C. Maximum Variation from Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.

E. Maintain dimensional tolerances and alignment with adjacent work.

3.5 ADJUSTING

A. Section 01 73 00 - Execution: Testing, adjusting, and balancing.

B. Adjust door assembly to smooth operation and in full contact with weatherstripping.

3.6 CLEANING

A. Section 01 77 00 – Closeout Procedures: Final cleaning.

B. Clean doors, frames and glass.

C. Remove temporary labels and visible markings.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 770 00 - Execution: Protection of installed construction.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes aluminum-framed storefronts including aluminum and glass doors, and frames including hardware, glass, and sliding service window. Section also includes storefront windows.

B. Related Sections:
1. Section 06 10 00 - Rough Carpentry: Wood framed openings.
2. Section 07 27 26 – Fluid-Applied Air Barriers: Perimeter air seal between glazing system and adjacent construction.
3. Section 07 90 00 - Joint Protection: System perimeter sealant and back-up materials.
4. Section 08 71 00 - Door Hardware: Mortised hardware reinforcement requirements affecting framing members.
5. Section 08 80 00 - Glazing.
6. Section 09 90 00 - Painting and Coating: Field painting of interior

1.2 REFERENCES

A. Aluminum Association:
1. AA ADM 1 - Aluminum Design Manual.

B. American Architectural Manufacturers Association/Window & Door Manufacturers Association:
1. AAMA/WDMA 101/I.S.2 - Specification for Windows, Doors and Unit Skylights.
2. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
3. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
4. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
5. AAMA SFM-1 - Aluminum Store Front and Entrance Manual.

C. ASTM International:
1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
3. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
4. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
5. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
6. ASTM E1886 -Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

7. ASTM F1642/F1642M - Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings.
8. ASTM F2247 - Standard Test Method for Metal Doors Used in Blast Resistant Applications (Equivalent Static Load Method).
9. ASTM F2927 - Standard Test Method for Door Systems Subject to Airblast Loadings.

D. National Fenestration Rating Council Incorporated:
1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.

1.3 SYSTEM DESCRIPTION

A. Aluminum-framed storefront system includes tubular aluminum sections with supplementary internal support framing, aluminum and glass entrances, shop fabricated, factory finished, glass and glazing, related flashings, anchorage and attachment devices.

B. System Assembly: Site assembled. Shop unitized assembly.

1.4 PERFORMANCE REQUIREMENTS

A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, including building corners.
1. As calculated in accordance with applicable code, as tested in accordance with ASTM E330.

B. Deflection: Limit mullion deflection to 1/175 for spans less than 13'-6" and 1/240 plus 1/4 inch for spans over 13'-6" or flexure limit of glass of span; with full recovery of glazing materials.

C. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

D. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.

E. Condensation Resistance Factor: CRF of not less than 45 when measured in accordance with AAMA 1503.

F. Water Leakage: None, when measured in accordance with AAMA/WDMA 101/I.S.2 or ASTM E331 with test pressure difference of 20 percent of design pressure, with minimum differential of 2.86 lbf/sq ft and maximum of 12.00 lbf/sq ft.

G. Thermal and Solar Heat Transmittance of Assembly (U Value and SHGC): Comply with ICC IEEC for climate zone in which project is located.

H. Expansion / Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over 12 hour period without causing detrimental effect to system components and anchorage.

I. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion, contraction joint location, and details.

C. Product Data: Submit component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

D. Design Data: Indicate framing member structural and physical characteristics, calculations, dimensional limitations.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA SFM-1 and AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Surface Burning Characteristics:
   1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

C. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation board.

1.7 QUALIFICATIONS

A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum three years documented experience.

B. Design structural support framing components under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Handle Products of this section in accordance with AAMA MCWM-1 - Curtain Wall Manual #10.

C. Protect finished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install sealants or glazing materials when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.10 COORDINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Coordinate the Work with installation of air barrier, components or materials.

1.11 WARRANTY

A. Section 01 77 00 – Closeout Procedures: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for glazed units.

PART 2 PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

A. Manufacturers:
1. CR Laurence
2. EFCO Corp.
3. Kawneer Co., Inc.
4. Trulite
5. Vistawall Architectural Products.
6. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description:
1. Aluminum Frame: 1- 3/4 inches x 4- 1/2 inches thermally broken applied glazing stops; drainage holes; internal weep drainage system.
2. Sill Frame: 4 inches x 4- 1/2 inches thermally broken applied glazing stops; drainage holes; internal weep drainage system.
3. Mullions: Profile of extruded aluminum with internal reinforcement of aluminum or shaped steel structural section.
4. Doors: Aluminum framed glass doors; 1-3/4 inches thick, 3-1/2 inches wide top rail, 5” wide vertical stiles, ADA 10” inch wide bottom rail; square glazing stops.

2.2 COMPONENTS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.

B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper.

C. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections, galvanized.

D. Glass: Specified in Section 08 80 00.

E. Glazing Materials: Storefront manufacturer's standard types to suit application and to achieve weather, moisture, and air infiltration requirements.

F. Flashings: Minimum 0.032 inch thick aluminum to match mullion sections where exposed.

G. Weather Barrier: Specified in Section 07 27 26.

H. Sealant and Backing Materials:
1. Sealant Used within System (Not Used for Glazing): Manufacturer's standard materials to achieve weather, moisture, and air infiltration requirements.
2. Perimeter Sealant: Specified in Section 07 90 00.

I. Fasteners: Stainless or Hot-dip galvanized steel, standard with storefront manufacturer.

J. Service Window Components:
1. Self-Latching Handle
2. Tempered Glass As Scheduled
3. Full bottom sliding track
4. Keyed Lock Assembly

5.

2.3 HARDWARE

A. Hardware per specification 08 71 00 Door Hardware unless otherwise noted in this section.

B. Push/Pulls:
   1. Storefront Manufacturer standard push/pulls
   2. Substitutions: Under provision of Section 01 60 00.

2.4 KEYING

A. Door Locks: Provide blank cores to Owner for keying.

B. Provide cylinder core and two keys.

C. Owner shall coordinate with contractor to replace construction cores with new cores.

2.5 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Prepare components with internal reinforcement for door hardware.

F. Reinforce framing members for imposed loads.

2.6 SHOP FINISHING

A. Color Anodized Aluminum Surfaces: AAMA 611, AA-M12C22A44 non-specular as fabricated mechanical finish, medium matte chemical finish, and Architectural Class I 0.7 mils clear anodized coating.

B. Concealed Steel Items: Galvanized to ASTM A123/A123M.

C. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.

D. Shop Primer for Steel Components: SSPC Paint 25 red oxide.

E. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

F. Extent of Finish:
   1. Apply factory coating to surfaces exposed at completed assemblies.
   2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.
   3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify dimensions, tolerances, and method of attachment with other Work.

C. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

3.2 INSTALLATION

A. Install wall system in accordance with AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor retarder materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install integral flashings and integral joint sealers.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

L. Install glass in accordance with manufacturer's recommendations.

M. Coordinate installation of perimeter sealants per manufacturer's recommendations

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspection to monitor quality of installation and glazing.

C. Test to AAMA 501.
   1. Architect to select one installed assembly for testing

3.5 ADJUSTING

A. Section 01 77 00 – Closeout Procedures: Testing, adjusting and balancing.

B. Adjust operating hardware for smooth operation.

3.6 CLEANING

A. Section 01 77 00 – Closeout Procedures: Final cleaning.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protection of installed construction.

B. Protect finished Work from damage.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes hardware for wood and steel doors.
   1. Provide door gaskets, including weatherstripping and seals, and thresholds.

B. Related Sections:
   1. Section 08 13 14 - Standard Steel Doors.
   2. Section 08 14 16 - Flush Wood Doors.
   3. Section 08 41 13 - Aluminum Framed Entrances and Storefront

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A156.1 - Butts and Hinges.
   2. ANSI A156.2 - Bored and Preassembled Locks and Latches.
   3. ANSI A156.3 - Exit Devices.
   4. ANSI A156.4 - Door Controls - Closures.
   5. ANSI A156.5 - Auxiliary Locks and Associated Products.
   6. ANSI A156.6 - Architectural Door Trim.
   7. ANSI A156.7 - Template Hinge Dimensions.
   8. ANSI A156.12 - Interconnected Locks and Latches.
   9. ANSI A156.16 - Auxiliary Hardware.
   10. ANSI A156.18 - Materials and Finishes.

B. Builders Hardware Manufacturers Association:
   1. BHMA Directory of Certified Products.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.

C. Prior to forwarding submittal:
   1. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   2. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

D. Door Hardware Schedule:
   1. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
   2. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.

3. Indicate complete designations of each item required for each opening, include:
    1) Door Index: door number, heading number, and Architect's hardware set number.
    2) Quantity, type, style, function, size, and finish of each hardware item.
    3) Name and manufacturer of each item.
    4) Fastenings and other pertinent information.
    5) Location of each hardware set cross-referenced to indications on Drawings.
    6) Explanation of all abbreviations, symbols, and codes contained in schedule.
    7) Mounting locations for hardware.
    8) Door and frame sizes and materials.
    9) Degree of door swing and handing.
    10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

E. Key Schedule:
1. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
2. Use ANSI/BHMA A156.28 ''Recommended Practices for Keying Systems'' as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
3. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
4. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
5. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
6. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

F. Informational Submittals:
1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    2. Include warranties for specified door hardware.

G. Shop Drawings:
1. Indicate locations and mounting heights of each type of hardware, schedules, and catalog cuts.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Project Record Documents: Record actual locations of installed cylinders and their master key code.

C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the following requirements:
1. ANSI A156 series.
2. NFPA 80.
3. UL 305.

B. Furnish hardware marked and listed in BHMA Directory of Certified Products.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Hardware Supplier: Company specializing in supplying commercial door hardware with minimum three years documented experience. Approved by primary hardware manufacturer Hardware Supplier Personnel: Employ Architectural Hardware Consultant (AHC) qualified person to assist in work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.8 COORDINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.

1.9 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.

B. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
1. Mechanical Warranty
1) Locks
1. Schlage ND Series: 10 years
2) Exit Devices

1. Von Duprin: 3 years

3) Closers
1. LCN 4000 Series: 30 years

4) Automatic Operators
1. LCN: 2 years

2. Electrical Warranty

1) Locks
1. Schlage: 1 year

2) Exit Devices
1. Von Duprin: 1 year

3) Closers
1. LCN: 2 years

1.10 MAINTENANCE MATERIALS

A. Section 01 77 00 - Closeout Procedures: Maintenance materials.

B. Furnish special wrenches and tools applicable for each different and for each special hardware component.

C. Furnish maintenance tools and accessories supplied by hardware component manufacturer.

1.11 EXTRA MATERIALS

A. Section 01 77 00 – Closeout Procedures: Spare parts and maintenance products.

B. Furnish two extra keys for each master keyed group.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.

B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fabrication
1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:
1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.3 HINGES

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:
    1) Ives 5BB series
2. Acceptable Manufacturers and Products:
    1) Hager BB1191/1279 series
2. McKinney TB series

B. Requirements:
1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
    1) Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
    2) Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
    1) Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
    2) Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
    1) Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
    2) Interior: Heavy weight, steel, 5 inches (127 mm) high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
    1) Steel Hinges: Steel pins
    2) Non-Ferrous Hinges: Stainless steel pins
    3) Out-Swinging Exterior Doors: Non-removable pins
    4) Out-Swinging Interior Lockable Doors: Non-removable pins
    5) Interior Non-lockable Doors: Non-rising pins
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.4 Energy Transfer Hinge

1. Access Hardware Supply - ETH8WH (Owner standard)
    1) Hardware supplier to coordinate hinge size with door supplier.
2. Finish: 626

2.5 ELECTRIC POWER TRANSFER

A. Manufacturers:
1. Scheduled Manufacturer and Product:
    1) Von Duprin EPT-10 (Owner standard)

B. Requirements:
1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.6 FLUSH BOLTS

A. Manufacturers:
1. Scheduled Manufacturer:
    1) Ives
2. Acceptable Manufacturers:
    1) Rockwood
    2) Trimco

B. Requirements:
1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.7 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      1) Schlage ND series (Owner standard)

B. Requirements:
   1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
   2. Cylinders: Refer to "KEYING" article, herein.
   3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
   4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
   5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
   6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
   7. Provide electrified options as scheduled in the hardware sets.
   8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
      1) Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
      2) Lever Design: Rhodes

2.8 EXIT DEVICES

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      1) Von Duprin 99 (Owner standard)

B. Requirements:
   1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
   2. Cylinders: Refer to "KEYING" article, herein.
   3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
   4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
   5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
   6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
   7. Provide flush end caps for exit devices.
   8. Provide exit devices with manufacturer's approved strikes.
   9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
   10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.

11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.9 ELECTRONIC ACCESS CONTROL LOCKSETS AND EXIT DEVICE TRIM

A. Manufacturers:
   1. Scheduled Manufacturer and Product:
      1) Schlage AD Series (Owner standard)

B. Requirements:
   1. Provide adaptable electronic access control products that comply with the following requirements:
      1) Listed, UL 294 - The Standard of Safety for Access Control System Units.
      2) Compliant with ANSI/BHMA A156.25 Grade 1 Operation and Security.
      3) Certified to UL10C, FCC Part15, Florida Building Code Standards TAS 201 large missile impact, TAS 202 and TAS 203.
      4) Compliant with ASTM E330 for door assemblies.
      5) Compliant with ICC / ANSI A117.1, NFPA 101, NFPA 80, and Industry Canada IC.
   2. Functions: Provide functions as scheduled that are field configurable without taking the adaptable electronic product off the door.
   3. Emergency Override: Provide mechanical key override; cylinders: Refer to "KEYING" article, herein.
   4. Levers:
      1) Vandal Resistance: Exterior (secure side) lever rotates freely while door remains locked, preventing damage to internal lock components from vandalism by excessive force.
      2) Provide non-handed lever trim that operates independently of non-locking levers.
      3) Style: Rhodes
      4) Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.
   5. Features:
      1) Audible feedback that can be enabled or disabled.
      2) Tamper-Resistant Screws: Tamper torx screws on inside escutcheon for increased security.
      3) Visual tri-colored LED indicators that indicate activation, additional PIN code credential required, operational systems status, system error conditions and low power conditions.

4) Door Position Switch
5) Interior Cover Tamper Guard
6) Mechanical Key Override
7) Request to Exit
8) Request to Enter
9) Lock/Unlock Status

6. Credential Reader
   1) Credential Reader Configuration: Provide credential reader modules in the following configurations as indicated in door hardware sets.
   2) Credential Reader Capabilities: Provide credential readers capable of operating with the following integrated software partners.
      1. 13.56 MHz Smart card credentials:
         1. Secure section (Multi-Technology and Smartcard): Schlage MIFARE Classic, Schlage MIFARE DESFire EV1/EV3, PIV and PIV-I Compatible
         2. 13.56 MHz Serial number only (Multi-Technology and Smartcard): MIFARE, DESFire, HID iClass, MIFARE DESFire EV1/EV3
         3. 125 kHz Proximity card credentials: Schlage, XceedID, HID, GE/CASI ProxLite and AWID.
      2. Multi-Technology readers that read both 13.56 MHz Smart Cards and 125 kHz Prox cards.
      3. Dual credential reading capabilities credential card or fob and PIN.
      4. 12 button keypad with backlit buttons.
      5. Magnetic Card Reader:
      6. Full insertion or swipe reader capable of reading information along full length of magnetic stripe.
      7. Magnetic card triple track reader capable of reading tracks 1, 2 or 3 per configuration in field.

7. Operation:
   1) Offline – access control rights stored on device
      1. Provide adaptable electronic access control products with the ability to be configured at door by handheld programming device the length of time device is unlocked upon access grant.
      2. Provide adaptable electronic access control products with the ability to communicate identifying information such as firmware versions, hardware versions, serial numbers, and manufacturing dates by handheld programming device.
   2) Networked – hardwired
      1. Adaptable electronic access control product system interface:
      2. Adaptable electronic access control products to have real-time bidirectional communication between access control system and lock.
      3. Credential Verification Time: less than 1 second.
      4. When Utilized with Partner Integrated Access Control Network Software with Remote Commanding Capability: Provide

adaptable electronic access control product with the ability to be remotely locked down or unlocked within 10 seconds or less, without user interface at the device.

5. Upon Loss of Power to Device: Provide adaptable electronic access control product with the ability to manage access control offline in one of three methods below that can be configured in the field at lockset by handheld programming device and remotely by Partner integrated software:
    1. Fail locked (secured)
    2. Fail unlocked (unsecured)
    3. Fail As-Is
6. Upon Loss of Communication Between Device and Network: Provide adaptable electronic access control product with the ability to manage access control offline in one of four methods below that can be configured in the field at device by handheld programming device and remotely by Partner integrated software:
    1. Fail locked (secured)
    2. Fail unlocked (unsecured)
    3. Fail As-Is
    4. Fail to Degraded/cache mode utilizing cache memory with following selectable options:
        (a) Grant access up to the last 1,000 unique previously accepted User IDs.
        (b) Grant access up to the last 1,000 unique previously accepted facility/site codes.
        (c) Remove from cache previously stored User IDs or facility/site codes that have not been presented to lock within the last 5 days.
7. Provide adaptable electronic access control product with the ability to be configured at door by handheld programming device and remotely by Partner integrated software the length of time device is unlocked upon access grant.
8. Provide adaptable electronic access control product with the ability to communicate identifying information such as firmware versions, hardware versions, serial numbers, and manufacturing dates by handheld programming device and remotely by Partner integrated software.

3) Networked – wireless
1. Adaptable electronic access control product system interface:
2. Adaptable electronic access control products to have real-time bidirectional communication between access control system and lock.
3. Remote Commanding By Partner Integrated Access Control Network Software: Battery-powered lockset shall have "Wake on Radio" feature causing activation of remote, wireless access control devices, enabling activated devices to be configured, locked or unlocked from a centralized location within 10 seconds or less without user interface at the device.

4. Local Commanding: Provide adaptable electronic access control product with the ability to be configured, locked or unlocked locally by handheld programming device, in real-time.
5. When Utilized with Access Control Network Software with Remote Commanding Capability: Provide adaptable electronic access control product with the ability to be remotely locked down or unlocked within 10 seconds or less while battery powered without user interface at the device.
6. Real-time response of battery powered device capable of being configured at door by handheld programming device and remotely by Partner integrated software.
7. Upon Loss of Power to Device: Provide adaptable electronic access control product with the ability to manage access control offline in one of three methods below that can be configured in the field at device by handheld programming device and remotely by Partner integrated software:
    1. Fail locked (secured)
    2. Fail unlocked (unsecured)
    3. Fail As-Is
8. Upon Loss of Communication Between Device and Network: Provide adaptable electronic access control product with the ability to manage access control offline in one of four methods below that can be configured in the field at lockset by handheld programming device and remotely by Partner integrated software:
    1. Fail locked (secured)
    2. Fail unlocked (unsecured)
    3. Fail As-Is
    4. Fail to Degraded/cache mode utilizing cache memory with following selectable options:
        (a) Grant access up to the last 1,000 unique previously accepted User IDs.
        (b) Grant access up to the last 1,000 unique previously accepted facility/site codes
        (c) Remove from cache previously stored User IDs or facility/site codes that have not been presented to lock within the last 5 days.
9. Provide adaptable electronic access control product with the ability to be configured at door by handheld programming device and remotely by Partner integrated software the length of time device is unlocked upon access grant.
10. Provide adaptable electronic access control product with the ability to communicate identifying information such as firmware versions, hardware versions, serial numbers, and manufacturing dates by handheld programming device and remotely by Partner integrated software.
11. Wireless Transmission:
    1. Modulation: 900 MHz spread spectrum, direct sequence, 10 channels.
    2. Encryption: AES-128-bit Key minimum.

C. Components

1. Product: Schlage HHD series with Utility Software. (OFFLINE)
    1) Provide Handheld Programming Device for adaptable electronic access control products capable of the following minimum requirements.
        1. Capable of initializing lock and accessories using preloaded software.
        2. Utilized to field configure electronic access control devices, to download firmware updates and door files to device, and to download audit files from device.
    2) Provide Panel Interface for adaptable electronic access control products.
        1. Product: Schlage PIB300-2D Panel Interface Board. (AD-300)
        2. Product: Schlage PIM400-485 or PIM400-TD2 Panel Interface Module as required. (AD-400)
        3. Product: Schlage PIM400-1501 Panel Interface Module. (AD-400)

2.10 ACCESS CONTROL READER

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:
    1) Schlage MT Series

B. Requirements:
1. Provide access control card readers manufactured by a global company who is a recognized leader in the production of access control devices. Card reader manufactured for non-access control applications are not acceptable
2. Provide multi-technology contactless readers complying with ISO 14443.
3. Provide access control card readers capable of reading the following technologies:
    1) CSN - DESFire® CSN, HID iCLASS® CSN, Inside Contactless PicoTag® CSN, ST Microelectronics® CSN, Texas Instruments Tag-It®, CSN, Phillips I-Code® CSN
    2) 125 KHz proximity - Schlage® Proximity, HID® Proximity, GE/CASI® Proximity, AWID® Proximity, LenelProx®
    3) 13.56 MHz Smart card - Schlage smart cards using MIFARE Classic® EV1, Schlage smart cards using MIFARE Plus®, Schlage smart cards using MIFARE® DESFire® EV1, Schlage smart cards using MIFARE® DESFire® EV2/EV3

2.11 POWER SUPPLIES

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:
    1) Schlage/Von Duprin PS900 Series
2. Acceptable Manufacturers and Products:
    1) Dynalock 5000 series
    2) Securitron BPS series
2. Security Door Controls 600 series

B. Requirements:
1. Provide power supplies approved by manufacturer of supplied electrified hardware.

2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
    1) 12/24 VDC Output, field selectable.
    2) Class 2 Rated power limited output.
    3) Universal 120-240 VAC input.
    4) Low voltage DC, regulated and filtered.
    5) Polarized connector for distribution boards.
    6) Fused primary input.
    7) AC input and DC output monitoring circuit w/LED indicators.
    8) Cover mounted AC Input indication.
    9) Tested and certified to meet UL294.
    10) NEMA 1 enclosure.
    11) Hinged cover w/lock down screws.
    12) High voltage protective cover.

2.12 CYLINDERS

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:
    1) Schlage (Owner Standard)

B. Requirements:
1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer’s series as indicated. Refer to “KEYING” article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
3. Nickel silver bottom pins.

2.13 KEYING

A. Scheduled System: (To be verified with owner)
1. New factory registered system:
    1) Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
2. Existing factory registered system:
    1) Provide cylinders/cores keyed into Owner’s existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
3. Existing non-factory registered system:
    1) Provide cylinders/cores keyed into Owner’s existing keying system managed by Owner’s locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference. Contact:
    2) Firm Name:
    3) Contact Person:
    4) Telephone:

B. Requirements:
1. Construction Keying:
1) Temporary Construction Cylinder Keying.
1. Provide construction cores that permit voiding construction keys without cylinder removal, furnished in accordance with the following requirements.
1. Split Key or Lost Ball Construction Keying System.
2. Construction control keys, and extractor tools or keys as required to void construction keying-quantity as required.
3. Construction change (day) keys- quantity as required.
2. Owner or Owner's Representative will void operation of temporary construction keys.
2) Replaceable Construction Cores.
1. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
(a) Construction control keys-quantity as required.
(b) Construction change (day) keys- quantity as required.
2. Owner or Owner's Representative will replace temporary construction cores with permanent cores.
2. Permanent Keying:
1) Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
1. Master Keying system as directed by the Owner.
2) Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3) Provide keys with the following features:
1. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
2. Patent Protection: Keys and blanks protected by one or more utility patent(s).
3. Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
4) Identification:
1. Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
2. Identification stamping provisions must be approved by the Architect and Owner.
3. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.

4. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
5. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

5) Quantity: Furnish in the following quantities.
1. Permanent Control Keys: quantity as required.
2. Master Keys: quantity as required.
3. Change (Day) Keys: cylinder/core that is keyed differently: quantity as required.
4. Key Blanks: Quantity as determined in the keying meeting.

2.14 DOOR CLOSERS

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:
1) LCN 4040XP series (Owner standard)

B. Requirements:
1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.15 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:

1) LCN 4600 series (Owner standard)

B. Requirements:
1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.16 COMPACT ELECTRO-HYDRAULIC AUTOMATIC OPERATOR

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:
1) LCN 6440XP (Owner standard)

B. Requirements:
1. Provide units with the following feature sets:
1) Fire alarm input
2) Adjustable spring size
3) Conventional door closer opening and closing forces unless motor is activated
4) Electronic power boost feature
5) Adjustable hold open time
6) On/off switch for manual operation
2. Provide non-handed low energy automatic operator units complying with ANSI/BHMA A156.19, UL 228 & 325, and ANSI 117.1.
3. Provide drop plates, brackets, adapters, and arms as required. Provide complete assemblies of controls, switches and parts/material recommended and approved by manufacturer of automatic operator for each individual opening. Locate actuators and other controls as directed by Architect.
4. Provide units that convert 120VAC via an external power supply or wall plug adapter and receive 24VDC.

2.17 DOOR TRIM

A. Manufacturers:
   1. Scheduled Manufacturer:
      1) Ives
   2. Acceptable Manufacturers:
      1) Trimco
      2) Rockwood

B. Requirements:
   1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.18 PROTECTION PLATES

A. Manufacturers:
   1. Scheduled Manufacturer:
      1) Ives
   2. Acceptable Manufacturers:
      1) Trimco
      2) Rockwood

B. Requirements:
   1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
   2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
   3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.19 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturers:
      1) Glynn-Johnson
   2. Acceptable Manufacturers:
      1) Rixson
      2) Sargent
      3) ABH

B. Requirements:
   1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.20 DOOR STOPS AND HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturer:
      1) Ives
   2. Acceptable Manufacturers:
      1) Trimco
      2) Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.21 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:
1. Scheduled Manufacturer:
1) Zero International
2. Acceptable Manufacturers:
1) National Guard
2) Pemko

B. Requirements:
1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.22 SILENCERS

A. Manufacturers:
1. Scheduled Manufacturer:
1) Ives
2. Acceptable Manufacturers:
1) Rockwood
2) Trimco

B. Requirements:
1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.23 DOOR POSITION SWITCHES

A. Manufacturers:
1. Scheduled Manufacturer:
1) Schlage
2. Acceptable Manufacturers:
1) GE-Interlogix
2) Sargent

B. Requirements:
1. Provide recessed or surface mounted type door position switches as specified.

2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.24 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:
1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

2.25 COMPONENTS

A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
    1) Finish: Match hardware item being fastened.

B. Hinges: ANSI A156.1, full mortise type complying with following general requirements unless otherwise scheduled.
1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
1. Fire Rated Doors to 86 inches High: Minimum three hinges.
2. Doors over 40 inches Wide: Extra heavy weight ball or oilite bearing hinges.
3. Doors 1-3/4 inch Thick: 4 inch size.
4. Doors 2 inch Thick: 5 inch extra heavy weight ball or oilite bearing.
5. Doors over 48 inches Wide: 5 inch extra heavy weight ball or oilite bearing.
3. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked out swinging doors, non-rising pins at interior doors.
4. Tips: Flat button tips with matching plug.

C. Continuous Hinges
1. Basis of Design:
    1) Ives: 112HD
2. Acceptable Alternate:
    1) Stanley: 661HD
    2) Hager: 780-112HD
    3) Select: SL11HD
    4) Pemko: FMSLFHD

3. Requirements: Geared Continuous Hinges: Shall utilize a single gear section for the door leaf and a separate gear section for the frame side of the door. Provide full mortise or surface applied hinge as scheduled in each set. Geared hinges are to be UL 10C tested and approved for 90 minutes.

D. Energy Transfer Hinge
1. Access Hardware Supply - ETH8WH
    1) Hardware supplier to coordinate hinge size with door supplier.
    2) Finish: 626
    3) No substitutions permitted.

E. Electric Power Transfer
1. Von Duprin – EPT-10
    1) No substitutions permitted.

F. Locksets: Furnish locksets compatible with specified cylinders. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
1. Cores: 7 pin, SFIC, L Keyway

G. Latch Sets: Match locksets. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.

H. Access Control Devices: Networked Hardwired Electronic Locks
1. Schlage AD-300 - No substitutions permitted.
    1) Cores: 7 pin, SFIC, Everest – Coordinate w/ owner for core release
2. Refer to specification Section 28 13 00 Access Control System.

I. Exit Devices: ANSI A156.3, Grade 1 rim type, with cross bar, unless otherwise indicated. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames,
1. Types: Suitable for doors requiring exit devices.
2. Cores: 7 pin, SFIC, Everest – Coordinate w/ owner for core release
3. Provide with:
    1) Quiet Electric Latch Retraction Device (QEL) where access control is called out (or)
    2) Command Access: MLRK1-VD
4. Basis of Design:
    1) Von Duprin: 98/99 Series, No substitutions permitted.

J. Cylinders: ANSI A156.5, Grade 1, interchangeable core type cylinders.
1. Cores Interior: 7 pin, SFIC, L Keyway
2. Cores Exterior: 7 pin, SFIC, Everest – Coordinate w/ owner for core release

K. Door Controls and Overhead Holders: Furnish with accessories as required for complete operational installation.
1. Low Energy Power Door Operators: ANSI A156.19 power mechanism which opens and closes door upon receipt of signal.
    1. Automatic Operator: LCN 4640
2. Wall Plate actuators: Interior and exterior Wireless
    3. Sequencer: LCN
    4. Control Box : LCN
    5. Finish: Match Door Finish

L. Closers: ANSI A156.4 modern type with cover, surface mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
4. Operating Pressure: Maximum operating pressure as follows.
    1) Interior Doors: Maximum 5 pounds.
    2) Exterior Doors: Maximum 8.5 pound.
    3) Fire Rated Doors: As required for fire rating, maximum 15 pounds.
5. Basis of Design:
    1) LCN: 4040XP-3049CNS
    2) No substitutions permitted.

M. Push/Pulls, Manual Bolts, Protection Plates, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.
1. Push/Pulls: ANSI A156.6; push plates minimum 0.050 inch thick. Furnish straight push-pull type pulls with bolts to secure from opposite door face; furnish with minimum 0.050 inch pull plates unless otherwise indicated.

1. Basis of Design:
    1) Ives: 8200 8305
2. Acceptable Alternate:
    1) Rockwood: 70C 111x70C
    2) Hager: 30S 31J
    3) Trimco: 1001 1018
3. Requirements:
    1) Push Plate: Provide 6 inch by 16 inch by .050 inch push plate constructed of stainless steel. Bevel all four edges.
    2) Pull Plate: Provide 4 inch by 16 inch by .050 inch push plate constructed of stainless steel, bevel all four edges. Provide 10 inch center to center (CTC) pull constructed of stainless steel with a diameter of 1 inch.

2. Manual Bolts: ANSI A156.16 Grade 1 top and bottom flush bolts, with dust-proof floor strike, unless otherwise indicated.
3. Kickplates: ANSI A156.6, metal; height indicated in Schedule by 2 inch less than door width; minimum 0.050 inch thick stainless steel.
    1) Protection Plates and Edge Guards
    2) Basis of Design:
        1. Ives: 8400 Series
    3) Acceptable Alternate:
        1. Rockwood: K1050
        2. Hager: 194S
        3. Trimco: K Series
    4) Requirements:
        1. Provide .050 inch thick stainless steel protection plates with height as scheduled. Plate shall have four beveled edges and countersunk screws. Provide plate with width as follows:

2. Pairs of Doors: Provide plate to be 1 inch less door width.
3. Single Doors: Provide plate to be 2 inches less door width on push side, pull side mounted plates to be 1 inch
4. Where plate exceeding 16 inches in height is scheduled on fire rated door, provide visual UL marking on plate and fasten using adhesive rather than screws.

4. Weatherstripping: Furnish continuous weatherstripping at top and sides of exterior doors.
   1) General:
      1. Provide weather strip and gasketing as scheduled.
      2. Size weather strip and gasket to provide a continuous seal around opening and at meeting stiles.
      3. Perimeter Seals
         1. Acceptable Products:
            (a) Zero: 429A 488S-BK
            (b) National Guard: 700SA 2525B
            (c) Pemko: 2891AS PK33D
      4. Astragals, Meeting Stiles, and Mullion Seals
         1. Acceptable Products:
            (a) Zero: 8780N
            (b) National Guard: 5100
            (c) Pemko: 5100SB
      5. Requirements
         1. Where overlapping astragals are scheduled on exterior doors, provide with thru-bolts.
         2. Where overlapping astragals are scheduled on out-swinging doors, provide for mounting on the pull-side of the active leaf. Otherwise, provide for mounting on the push-side of the inactive leaf.
      6. Door Bottoms
         1. Acceptable Products:
            (a) Zero: 39A
            (b) National Guard: 601
            (c) Pemko: 18100CNB

5. Thresholds: Maximum 1/2 inch height.
   1) Acceptable Products:
      1. Zero International: 545A
      2. National Guard: 425HD
      3. Pemko: 1715A
   2) Requirements:
      1. Saddle thresholds: Provide with length equal to the width of the opening.
      2. Panic thresholds: Provide with length equal to the overall frame width. Provide with mitered and welded ends.
      3. Where floor closers are scheduled with thresholds, provide threshold with factory cut outs to be compatible with the provided floor closer.

4. Provide stainless steel machine screws and lead anchors for each threshold.

6. Wall and Floor Stops: ANSI A156.1, Grade 1, concave pad wall stop with no visible screws.
   1) Basis of Design:
      1. Ives: WS406/407 FS439
   2) Acceptable Alternate:
      1. Rockwood: 405/406 441H
      2. Hager: 236W 242F
      3. Trimco: 1270 W1211
   3) Requirements:
      1. Provide stops and holders as indicated in the hardware sets.
      2. Where wall bumpers are scheduled, provide concave rubber bumper where the adjacent lever trim incorporates a push-button. Otherwise, provide convex rubber bumpers.

2.26 MISCELLANEOUS HARDWARE

A. Silencers
   1. Acceptable Products:
      1) Ives: SR64
   2. Rockwood: 608
      1) Hager: 307D
      2) Trimco: 1229A
      3) Requirements:
         1. Where indicated on single openings, provide 3 each rubber silencers on lock jamb.
         2. Where indicated on paired openings, provide 2 each rubber silencers on header.

2.27 ACCESSORIES

A. Lock Trim: Furnish levers with as selected from manufacturer's full range of levers and roses.
   1. Do not permit through bolts on solid wood core doors.

B. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible.
   1. Do not uses through bolts on solid wood core doors.

2.28 HIGH SECURITY EMERGENCY KEY BOX

A. Acceptable Products:
   1. Knox, Inc. 3200 Series x RMK
   2. Requirements:
   1. Provide recess-mounted emergency key box as approved by the local fire jurisdiction. Key box to be master-keyed as dictated by local fire jurisdiction.

2.29 FINISHING

A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
   1. Hinges:
      1) 626, 26D Satin Chromium Plated

2. Typical Exterior Exposed and High Use Interior Door Hardware:
    1) 626, 26D Satin Chromium Plated
    2) Typical Interior Door Hardware: 626, 26D Satin Chromium Plated
3. Thresholds: Finish appearance to match door hardware on exterior face of door.
    1) 626, 26D Satin Chromium Plated
4. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

B. Mounting Heights from Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.
1. Locksets: 38 inch.
2. Push/Pulls: 42 inch.
3. Dead Locks: 48 inch.
4. Cross Bar Type Exit Devices: 38 inch.
5. Top Hinge: Jamb manufacturer's standard, but not greater than 10 inches from head of frame to center line of hinge.
6. Bottom Hinge: Jamb manufacturer's standard, but not greater than 12-1/2 inches from floor to center line of hinge.
7. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

3.4 ADJUSTING

A. Section 01 77 00 - Closeout Procedures: Testing, adjusting, and balancing.

B. Adjust hardware for smooth operation.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protection of installed construction.

B. Do not permit adjacent work to damage hardware or hardware finish.

3.6 SCHEDULES

A. See door hardware schedule sheet A600 with hardware sets as follows:

3.8 DOOR HARDWARE SETS

A. The following schedule of hardware sets shall be considered a guide and the supplier is cautioned to refer to general conditions, special conditions, and the full requirements of this section. It shall be the hardware supplier's responsibility to furnish all required hardware.

B. Where items of hardware are not definitely or correctly specified and are required for completion of the Work, a written statement of such omission, error, conflict, or other discrepancy shall be sent to the Architect, prior to date specified for receipt of bids, for clarification by addendum.

C. Adjustments to the Contract Sum will not be allowed for omissions or items of hardware not clarified prior to bid opening.

HW SET: 01

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

100A **111A**

6	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	REMOVABLE MULLION	KR 5654 w/cylinder & Core w/ 299 Strikes	695	VON
1	EA	CYLINDER w/ CORE for removable mullion	7 PIN, SFIC, L KEYWAY	695	VON
1	EA	CRASH BAR	99NLOP RIM DEVICE, NIGHT LATCH	695	VON
1	EA	CRASH BAR	99EO RIM DEVICE, EXIT ONLY	695	VON
2	EA	PULL	FROM STOREFRONT MANUF.		
1	**EA**	**ACCESS CONTROL**	**MT11-485 READER (BY SECURITY CONTRACTOR)**	**BLK**	**SCH**
2	EA	ELEC. POWER TRANSFER	EPT-10		VON
1	EA	CYLINDER w/ CORE	7 PIN, SFIC, Everest	626	SCH
1	EA	SURFACE CLOSER	4040XP-3049CNS	695	LCN
1	EA	DOOR OPERATOR	4640	626	LCN
1	EA	ACTUATOR PKG	8310-3857T	630	LCN
2	EA	REQ. TO EXIT	COMMAND ACCESS: VDREXKIT-ED		CMD
2	EA	MOTORIZED LATCH RETRACTION	COMMAND ACCESS: MLRK1-VD	626	CMD
2	EA	GASKETING	429AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
2	EA	FLOOR STOP	FS439	630	IVE
1	EA	THRESHOLD	545A-223	A	ZER
1	**EA**	**POWER SUPPLY**	**BY SECURITY CONTRACTOR**	**LGR**	**SCE**
4	EA	WIRE HARNESS	CON-XX SIZE AS REQUIRED		

AUTO LOCK UNLOCK THROUGH ACCESS CONTROL/SECURITY SYSTEM. WHEN LOCKED, CARD IN. USER PRESENTS CREDENTIAL, ELECTRIFIED LOCKSET LEVER RELEASES, USER DEPRESSES LEVER TO RETRACT LATCH AND OPEN DOOR. COORD. W/ SECTION 28 13 00 ACCESS CONTROL SYSTEM. ADA DOOR OPERATOR SHALL BE ACTIVATED ONLY WHEN ALLOWED BY ACCESS CONTROL SYSTEM.

HW SET: 02

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

100B 111B

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	PUSH	8200	695	IVE
2	EA	PULL	8305	695	IVE
1	EA	SURFACE CLOSER	4040XP-3049CNS	695	LCN
1	EA	DOOR OPERATOR	4640	626	LCN
2	EA	GASKETING	429AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
2	EA	FLOOR STOP	FS439	630	IVE
1	EA	ACTUATOR PKG	8310-3857T	630	LCN

HW SET: 03

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

103 105 106 108 109 110 112

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	ND53JD RHO	626	SCH
1	EA	CORE	7 PIN, SFIC, L KEYWAY	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER

HW SET: 04

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS

104 113 114 116 127A

2	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	ENERGY TRAN. HINGE	ET8HW	626	ACC
1	EA	ACCESS CONTROL	AD-300-CY-50-MT-RHO-626	626	SCH
1	EA	CORE	7 PIN, SFIC, L KEYWAY	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	**EA**	**POWER SUPPLY**	**BY SECURITY CONTRACTOR**	**LGR**	**SCE**

HW SET: 05

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

107

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	SURFACE CLOSER	4040XP-3049CNS	695	LCN
1	EA	ENTRANCE LOCK	ND53JD RHO	626	SCH
1	EA	CORE	7 PIN, SFIC, L KEYWAY	626	SCH
1	EA	FLOOR STOP	FS439	630	IVE
1	EA	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 06

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

118 119 120

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	SURFACE CLOSER	4040XP w/ 6440 Module Kit	695	LCN
1	EA	MORTISE PRIVACY	LV9496-G-06-626 w/ XL13-439	626	SCH
1	EA	FLOOR STOP	FS439	630	IVE
1	EA	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 07

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

117 121

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	SURFACE CLOSER	4040XP-3049CNS	695	LCN
1	EA	CORRIDOR LOCK	ND73PD RHO	626	SCH
1	EA	CORE	7 PIN, SFIC, L KEYWAY	626	SCH
1	EA	FLOOR STOP	FS439	630	IVE
1	EA	GASKETING	429AA-S	AA	ZER
3	EA	SILENCER	SR64	GRY	IVE
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HW SET: 08

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

115A		124AA	124AC	125AA	125AC		
3	EA	HINGE		5BB1 4.5 X 4.5		652	IVE
1	EA	SURFACE CLOSER		4040XP-3049CNS		695	LCN
1	EA	ENTRANCE LOCK		ND53JD RHO		626	SCH
1	EA	CORE		7 PIN, SFIC, L KEYWAY		626	SCH
1	EA	FLOOR STOP		FS439		630	IVE
1	EA	GASKETING		429AA-S		AA	ZER
1	EA	THRESHOLD		545A-223		A	ZER
1	EA	DOOR SWEEP		39A		A	ZER
3	EA	SILENCER		SR64		GRY	IVE

HW SET: 09

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

115B		124B	124J	125D	125F		
2	EA	HINGE		5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	ENERGY TRANSFER HINGE		ET8HW		626	ACC
1	EA	CRASH BAR		99NL RIM DEVICE, NIGHT LATCH		695	VON
1	EA	REQ. TO EXIT		COMMAND ACCESS: VDREXKIT-ED			CMD
2	EA	MOTORIZED LATCH RETRACTION		COMMAND ACCESS: MLRK1-VD		626	CMD
1	**EA**	**ACCESS CONTROL**		**MT11-485 READER (BY SECURITY CONTRACTOR)**		**BLK**	**SCH**
1	EA	CORE		7 PIN, SFIC, Everest		626	SCH
1	EA	SURFACE CLOSER		4040XP-3049CNS		695	LCN
2	EA	KICK PLATE		8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING		429AA-S		AA	ZER
1	EA	DOOR SWEEP		39A		A	ZER
1	EA	THRESHOLD		545A-223		A	ZER
1	**EA**	**POWER SUPPLY**		**BY SECURITY CONTRACTOR**		**LGR**	**SCE**

AUTO LOCK UNLOCK THROUGH ACCESS CONTROL/SECURITY SYSTEM. WHEN LOCKED, CARD IN. USER PRESENTS CREDENTIAL, ELECTRIFIED LOCKSET LEVER RELEASES, USER DEPRESSES LEVER TO RETRACT LATCH AND OPEN DOOR. COORD. W/ SECTION 28 13 00 ACCESS CONTROL SYSTEM.

HW SET: 10

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

124A		**125A**			
4	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
2	EA	ENERGY TRANSFER HINGE	ET8HW	626	ACC
1	EA	REMOVABLE MULLION	KR 5654 w/cylinder & Core w/ 299 Strikes	695	VON
1	EA	CYLINDER w/ CORE for removable mullion	7 PIN, SFIC, L KEYWAY	695	VON
1	EA	CRASH BAR	99NL RIM DEVICE, NIGHT LATCH	695	VON
1	EA	CRASH BAR	99DT RIM DEVICE, EXIT ONLY	695	VON
2	EA	REQ. TO EXIT	COMMAND ACCESS: VDREXKIT-ED		CMD
2	EA	MOTORIZED LATCH RETRACTION	COMMAND ACCESS: MLRK1-VD	626	CMD
1	**EA**	**ACCESS CONTROL**	**MT11-485 READER (BY SECURITY CONTRACTOR)**	**BLK**	**SCH**
1	EA	Cylinder w/ CORE	7 PIN, SFIC, L Keyway	626	SCH
2	EA	SURFACE CLOSER	4040XP-3049CNS	695	LCN
4	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	GASKETING	429AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
2	EA	WALL STOP	WS406/407CCV	630	IVE
1	**EA**	**POWER SUPPLY**	**BY SECURITY CONTRACTOR**	**LGR**	**SCE**

AUTO LOCK UNLOCK THROUGH ACCESS CONTROL/SECURITY SYSTEM. WHEN LOCKED, CARD IN. USER PRESENTS CREDENTIAL, ELECTRIFIED LOCKSET LEVER RELEASES, USER DEPRESSES LEVER TO RETRACT LATCH AND OPEN DOOR. COORD. W/ SECTION 28 13 00

HW SET: 11

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

124BA		**124BB**			
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	SURFACE CLOSER (Active Leaf)	4040XP	695	LCN
1	EA	ENTRANCE LOCK	ND53JD RHO	626	SCH
2	EA	CORE	7 PIN, SFIC, L KEYWAY	626	SCH
1	EA	DEADBOLT	B662P (Active Leaf)	626	SCH
1	EA	ASTRAGAL (Inactive Leaf)	BY DOOR MFG/SUPPLIER		B/O
1	EA	TOP & BOTTOM FLUSH BOLTS	265	626	IVES
1	EA	STRIKE (Inactive Leaf)	10-027	626	SCH
2	EA	FLOOR STOP	FS439	630	IVE
2	EA	GASKETING	429AA-S	AA	ZER

HW SET: 12

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

125BA 125CA

5	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENERGY TRANSFER HINGE	ET8HW	626	ACC
1	EA	SURFACE CLOSER (Active Leaf)	4040XP-3049CNS	695	LCN
1	EA	ACCESS CONTROL	AD-300-CY-50-MT-RHO-B-12/24	626	SCH
1	EA	CORE	7 PIN, SFIC, L KEYWAY	626	SCH
1	EA	ASTRAGAL (Inactive Leaf)	BY DOOR MFG/SUPPLIER		B/O
1	EA	STRIKE (Inactive Leaf)	10-027	626	SCH
2	EA	FLOOR STOP	FS439	630	IVE
2	EA	GASKETING	429AA-S	AA	ZER
1	EA	TOP & BOTTOM FLUSH BOLTS	265	626	IVES
1	**EA**	**POWER SUPPLY**	**BY SECURITY CONTRACTOR**	**LGR**	**SCE**

HW SET: 13

DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)

126A

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	CORE	7 PIN, SFIC, L KEYWAY	626	SCH
1	EA	FLOOR STOP	FS439	630	IVE
1	EA	GASKETING	429AA-S	AA	ZER
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass glazing for metal frames, doors, windows, glazed walls
   2. Glass glazing materials and installation requirements are included in this section for other sections referencing this section

B. Related Sections:
   1. Section 07 90 00 - Joint Protection: Sealant and back-up material other than glazing sealants
   2. Section 08 13 14 - Standard Steel Doors: Glazed doors
   3. Section 08 14 16 - Flush Wood Doors: Glazed doors

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings Safety

B. American Society of Civil Engineers:
   1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures

C. ASTM International:
   1. ASTM C509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
   2. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
   3. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
   4. ASTM C1036 - Standard Specification for Flat Glass
   5. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass
   6. ASTM C1193 - Standard Guide for Use of Joint Sealants
   7. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass
   8. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
   9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
   10. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
   11. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
   12. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation
   13. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to

Cyclic Pressure Differentials

14. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes

D. Consumer Products Safety Commission:
   1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing

E. Glass Association of North America:
   1. GANA - Sealant Manual
   2. GANA - Glazing Manual

F. National Fenestration Rating Council Incorporated:
   1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors
   2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence
   3. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems

G. National Fire Protection Association:
   1. NFPA 80 - Standard for Fire Doors, Fire Windows
   2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies
   3. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies

H. Underwriters Laboratories Inc.:
   1. UL 10C - Positive Pressure Fire Tests of Door Assemblies
   2. UL - Building Materials Directory

1.3 PERFORMANCE REQUIREMENTS

A. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with materials described in Section 07 27 26, and 07 90 00
   2. To utilize inner pane of multiple pane sealed units for continuity of air barrier and vapor retarder seal
   3. To maintain continuous air barrier and vapor retarder throughout glazed assembly from glass pane to heel bead of glazing sealant

B. Wind Loads: Design and size glass to withstand positive and negative wind loads acting normal to plane of wall, including increased loads at building corners
   1. Design Wind Load: As calculated in accordance with applicable code

C. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable code

D. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch, whichever is less with full recovery of glazing materials

E. Interior Glass Deflection: Maximum differential deflection for two adjacent unsupported edges when 50 plf force is applied to one panel at any point up to 42 inches above finished floor less than thickness of glass

F. Thermal and Solar Optical Performance: Measured or calculated in accordance with the following:
   1. Maximum U-Values: Comply with ICC IEEC for climate zone in which project is located. Measure in accordance with AAMA 1503 or NFRC 100
   2. Maximum SHGC: Comply with ICC IEEC for climate zone in which project is located.

Measure in accordance with NFRC 200
3. Solar Optical Properties: NFRC 300

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data:
1. Glass: Provide structural, physical, and thermal and solar optical performance characteristics, size limitations, special handling or installation requirements
2. Glazing Sealants, Compounds, and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements
3. Identify available colors were exposed

C. Samples:
1. Glass: Submit two samples of sufficient size illustrating each glass units, coloration and design
2. Glazing Materials: Submit bead of glazing sealant and gaskets, color as selected

D. Manufacturer's Certificate: Certify sealed insulating and environmental glass, meets or exceeds specified requirements

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual, GANA Sealant Manual, GANA Laminated Glass Design Guide for glazing installation methods

B. Apply label from agency approved by authority having jurisdiction to identify each fire rated glass lite

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements

B. Do not install glazing when ambient temperature is less than 50 degrees F

C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds

1.8 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds

B. Furnish ten-year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same

PART 2 - PRODUCTS

2.1 FLOAT GLASS MATERIALS

A. Annealed Glass: ASTM C1036, Type 1 transparent flat, Quality Q3, float glass
   1. Furnish annealed glass except where heat strengthened or tempered glass is required to meet specified performance requirements

B. Tempered Glass: ASTM C1048, Type 1 transparent flat, Quality Q3, Kind FT fully tempered, Condition A uncoated, float glass with horizontal tempering
   1. Furnish tempered glass where heat strengthened glass cannot meet specified performance requirements
   2. Furnish tempered glass conforming to CPSC 16 CFR 1201 Category II at locations where safety glass is required by applicable code as indicated on Drawings

2.2 FLOAT GLASS PRODUCTS

1. AGC Flat Glass North America, Inc**;**
2. Guardian Glass
3. Pilkington North America
4. Trulite Glass

B. Clear Glass: Annealed, and Tempered float glass as specified; Class 1 clear
   1. Clear annealed glass (GL-3)
   2. Clear heat strengthened glass (FG-CH)
   3. Clear tempered glass (GL-4)
   4. Minimum Thickness: 1/4 inch

C. Low E Glass: Annealed, and Tempered float glass as specified; Class 1 clear
   1. Clear Low E annealed glass (FG-ECA)
   2. Clear Low E tempered glass (FG-ECT)
   3. Tinted Low E annealed glass (FG-ETA)
   4. Tinted Low E heat strengthened glass (FG-ETH)
   5. Tinted Low E tempered glass (FG-ETT)
   6. Minimum Thickness: 1/4 inch
   7. Coating: ASTM C1376; Pyrolytic
   8. Solar Light Transmittance: 34 percent minimum
   9. Solar Heat Gain Coefficient: 0.39 maximum

2.3 INSULATING GLASS PRODUCTS

A. Insulating Glass Manufacturers:
   1. AGC Flat Glass North America, Inc
   2. Guardian Glass.; SunGuard
   3. Oldcastle Building Envelope
   4. Pilkington North America
   5. Viracon, Inc
   6. Substitutions: Section 01 60 00 - Product Requirements

B. Insulating Glass: ASTM E2190 certified by Insulating Glass Certification Council and Insulating Glass Manufacturers Alliance; with glass elastomer, glass to mastic silicone, and sealant edge seal; place reflective film within unit; purge interpane space with dry hermetic air
   1. Total Unit Thickness: 1 inch
   2. Insulating Glass Unit Edge Seal Construction: Aluminum or Stainless steel, thermally

broken, bent and soldered or bent and spot welded mitered and spigoted corners
3. Insulating Glass Unit Edge Seal Material: clear color

C. Double Pane Insulating Vision Glass (IG-2):
1. Total Unit Thickness: 1 inch
2. Outer Pane: Glass Type: FG-ECA
3. Inner Pane: Glass Type GL-3
4. U-Factor Winter: .25 maximum
5. Solar Heat Gain Coefficient: .28 maximum
6. Visible Light Transmittance: 34 percent minimum
7. Light Reflectance (out): 6%

D. Double Pane Insulating Vision Glass Tempered (IG-3):
1. Total Unit Thickness: 1 inch
2. Outer Pane: Glass Type: FG-ECA
3. Inner Pane: Glass Type GL-4
4. U-Factor Winter: .25 maximum
5. Solar Heat Gain Coefficient: .28 maximum
6. Visible Light Transmittance: 34 percent minimum
7. Light Reflectance (out): 6%

2.4 GLAZING SEALANTS

A. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, insulating glass seals, and glazing channels
1. Glazing Compounds: As recommended by manufacturer

B. Glazing Putty or Compounds: Match existing
1. Glazing Putty: Oil and resin base caulking compound, hardening type; knife grade consistency; manufacturer's standard white color
2. Glazing Compound: Modified oil type, non-hardening, knife grade consistency; manufacturer's standard gray color

C. Dense Gaskets: Resilient extruded shape to suit glazing channel retaining slot; color as selected
1. Neoprene: ASTM C864
2. EPDM: ASTM C864
3. Silicone: ASTM C1115

D. Soft Gaskets: ASTM C509; resilient extruded shape to suit glazing channel retaining slot; color as selected
1. Neoprene
2. EPDM
3. Silicone

E. Pre-Formed Glazing Tape: Size to suit application
1. Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color
a. Butyl Corner Sealant: ASTM C920 single component non-skinning butyl compatible with glazing tape; color to match tape

2.5 GLAZING ACCESSORIES

A. Translucent Film
1. Submit 12x12 inch in size, illustrating each color in 10%, 30% and 50% visual

transmittance for Architect's selection.
a. (PF-1) 3M (Or Approved Equal)
1) Crytal Glass Finishes
2) Frosted Crystal – 7725SE-324
3) Material: Vinyl
4) Shading Coefficient: 0.93
5) Solar Heat Transmittance: 64%
b. (PF-2) Decorative Films Solyx (Or Approved Equal)
1) Yellow Sand Blast SXB-21
2. Spandrel Coating
a. OPACI-COAT-300® (Or Approved Equal)
b. Color: Medium Gray #3-0586

B. Setting Blocks: Elastomeric material recommended by glass manufacturer, 80 to 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area

C. Spacer Shims: Elastomeric material recommended by glass manufacturer, 50 to 60 Shore A durometer hardness, minimum 3 inch long x one half the height of glazing stop x thickness to suit application

D. Glazing Clips: Manufacturer's standard type

E. Fire-Resistant Glazing Materials: Materials used to obtain required fire-resistant rating

F. Smoke Removal Unit Targets: Adhesive targets affixed to glass to identify glass units destined for removal for smoke control

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Verify openings for glazing are correctly sized and within acceptable tolerance

C. Verify surfaces of glazing channels or recesses are clean, free of obstructions impeding moisture movement, weeps are clear, and ready to receive glazing

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

3.3 INSTALLATION

A. Perform installation in accordance with GANA Glazing Manual
1. Glazing Sealants: Comply with ASTM C1193
2. Fire Rated Openings: Comply with NFPA 80

B. Interior Dry Method (Tape and Tape) Installation:
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 block no more than 6 inches from corners
3. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit
4. Place glazing tape on free perimeter of glazing in same manner described above.
5. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact
6. Knife trim protruding tape

C. Plastic Film Installation:
1. Install plastic film with adhesive
2. Place without air bubbles, creases or visible distortion
3. Fit tight to glass perimeter with razor cut edge

3.4 CLEANING

A. Section 01 77 00 - Closeout Procedures: Final cleaning

B. Remove glazing materials from finish surfaces

C. Remove labels after Work is complete

D. Clean glass and adjacent surfaces

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protection of installed construction

B. After installation, mark pane with an 'X' by using removable plastic tape or paste
1. Do not mark heat absorbing or reflective glass units

3.6 SCHEDULE

A. Glazing as indicated on the Door and Window Schedule along with the drawings

END OF DIVISION

DIVISION 09 FINISHES

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Gypsum board and joint treatment
2. Tile & Epoxy backer board
3. Acoustic insulation
4. Textured finishes

B. Related Requirements:
1. Section 06 10 00 - Rough Carpentry: Building wood framing system
2. Section 06 10 53 - Miscellaneous Rough Carpentry: Wood support blocking
3. Section 06 10 53 - Miscellaneous Rough Carpentry: Product requirements for frames for washroom accessories for placement by this section
4. Section 07 21 16 - Blanket Insulation: Acoustic and Thermal insulation

1.2 REFERENCE STANDARDS

A. ASTM International:
1. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
2. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing
3. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
4. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board
5. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases
6. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing
7. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets
8. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets
9. ASTM C1396/C1396M - Standard Specification for Gypsum Board
10. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
11. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
12. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials

B. Gypsum Association:
1. GA 214 - Recommended Levels of Gypsum Board Finish
2. GA 216 - Application and Finishing of Gypsum Board
3. GA 600 - Fire Resistance Design Manual Sound Control

C. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings

D. National Fire Protection Association:
   1. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls, Method B
   2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Wall and Ceiling Interior Finish

E. Underwriters Laboratories Inc.:
   1. UL - Fire Resistance Directory

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Product Data: Submit data on metal framing, gypsum board, joint tape; and acoustic accessories

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C840, GA-214, GA-216 and GA-600

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience

PART 2 - PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Manufacturers:
   1. CertainTeed Corporation.
   2. Georgia-Pacific Gypsum LLC.
   3. National Gypsum Company.
   4. USG Corporation.
   5. Substitutions: Section 01 60 00 - Product Requirements

B. Performance / Design Criteria:
   1. Select stud thickness to resist minimum 5 psf uniform load and maximum 1/360 deflection.

2.2 COMPONENTS

A. Gypsum Board: ASTM C1396/C1396M; Type X fire resistant where indicated on Drawings
   1. Standard Gypsum Board: Thickness as indicated on the drawings; maximum available length in place; ends square cut, tapered and beveled edges
   2. Moisture Resistant Gypsum Board: Thickness as indicated on the drawings; maximum available length in place; ends square cut, tapered and beveled edges

B. Tile and Epoxy Wall Coating Backer Boards:
   1. Fiber Mat Reinforced Cement Tile Backer Board: ASTM C1325; high density, glass fiber reinforced; 1/2 inch thick; mold resistant

2. Tile Backer Board Joint Tape: 2 inch wide, coated glass fiber tape for joints and corners

2.3 ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced, Thickness as indicated on the drawings

B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board

C. Gypsum Board Accessories: ASTM C1047; metal plastic, metal and paper combination; corner beads, edge trim, and expansion joints
1. Metal Accessories: Galvanized steel
2. Plastic Accessories: PVC plastic or ABS plastic
3. Edge Trim: Type LC, L, and U bead

D. Joint Materials: ASTM C475/C475M; reinforcing tape, joint compound, and water
1. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
2. Prefilling: At open joints rounded or beveled panel edges and damaged surface areas, use setting-type taping compound.
3. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories.
4. Fill Coat: For second coat drying-type, all-purpose compound.
5. Finish Coat: For third coat, use drying-type, all-purpose compound.
6. Skim Coat: For final coat of Level 5 finish, use [setting-type, sandable topping drying-type, all-purpose compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim
7. coat to produce Level 5 finish
8. No lite weight topping compounds allowed for finishing purposes.

E. Gypsum Board Screws: ASTM C954; length to suit application
1. Screws for Steel Framing: Type S
2. Screws for Wood Framing: Type W

F. Drywall “J” Molding Trim:
1. Manufacturer: Fry Reglet
   a. Finish: Anodized Silver
   b. Model: JDM-625

G. Drywall Wall to Ceiling Transition: W Reveal
1. Manufacturer: Fry Reglet
   a. Finish: White
   b. Model: DRWT-75-75

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Requirements for installation examination

B. Verify site conditions are ready to receive work and opening dimensions are as indicated on drawings

3.2 INSTALLATION

A. Wall Furring Installation:
   1. Erect wall furring for direct attachment to concrete masonry walls
   2. Erect furring channels vertically; space maximum 24 inches oc, not more than 4 inches from abutting walls
      a. Secure in place on alternate channel flanges at maximum 24 inches on center
   3. Install thermal insulation between Z-furring channels directly attached to concrete masonry walls

B. Acoustic Accessories Installation:
   1. Install resilient channels at maximum 24 inches on center
      a. Locate joints over framing members
   2. Place acoustic insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions
   3. Install acoustic sealant at gypsum board perimeter at:
      a. Metal Framing: One beads
      b. Seal penetrations of partitions by conduit, pipe, duct work, and rough-in boxes

C. Gypsum Board Installation:
   1. Install gypsum board in accordance with GA-216. Install moisture resistant gypsum board on walls and ceilings where plumbing fixtures, water heaters, or equipment plumbed with water is present.
   2. Erect single layer board in most economical direction, with ends and edges occurring over firm bearing
   3. Erect single layer fire rated gypsum board in most economical direction, with edges and ends occurring over firm bearing
   4. Use screws when fastening gypsum board to metal furring or framing
   5. Use screws when fastening gypsum board to wood furring or framing
   6. Place corner beads at external corners Use longest practical length
   7. Place edge trim where gypsum board abuts dissimilar materials
   8. Install cementitious backing board over metal studs
   9. Install cementitious backing board over metal studs in all areas called out to receive Epoxy Wall Coating

D. Joint Treatment:
   1. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes
   2. Feather coats on to adjoining surfaces so that camber is maximum 1/32 inch
   3. Tape joints to a minimum Level 5 Finish
   4. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile
   5. Fill and finish joints and corners of cementitious backing board

E. Finish: Smooth Level 5 Finish

3.3 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

B. Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet

END OF SECTION

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes metal stud framing, furring, and accessories at interior locations.

B. Related Sections:
1. Section 05 50 00 - Metal Fabrication: Metal fabrications attached to stud framing.
2. Section 09 21 16 - Gypsum Board Assemblies: Metal studs for partitioning.

1.2 REFERENCES

A. ASTM International:
1. Iron and Steel Products.
2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
4. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
5. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.

B. National Association of Architectural Metal Manufacturers:
1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data describing standard framing member materials and finish, product criteria, load charts, and limitations.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C754, and NAAMM ML/SFA 540.

B. Form, fabricate, install, and connect components in accordance with NAAMM ML/SFA 540.

C. Furnish framing and furring materials in accordance with SSMA - Product Technical Information.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years' experience.

1.6 COORDINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Coordinate placement of components within stud framing system specified in other sections.

PART 2 PRODUCTS

2.1 METAL FRAMING SYSTEM

A. Manufacturers:
1. Clark Steel Framing Systems.
2. Dietrich Industries, Inc.
3. Harrison Manufacturing Co.
4. Marino/Ware.
5. SCAFCO Steel Stud Manufacturing Co.
6. Unimast Incorporated.
7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. Studs/Furring: ASTM A653/A653M, non-load bearing rolled steel, channel shaped, punched for utility access, as follows:
1. Depth: as shown on the drawings.
2. Profiles: As shown on the drawings.
3. “Z” Furring & Hat Channel: Sizes as indicated on drawings.
4. Thickness: 25 gauge with 22 gauge at jambs of all openings.

B. Walls taller than 10’-0” shall use a minimum of 20 gauge studs

C. Tracks and Headers: Same material and thickness as studs, bent leg retainer notched to receive studs. Ceiling Runners: With extended leg retainer.

D. Fasteners: ASTM C1002; Type S, length to suit application.

E. Sheet Metal Backing: 20 gauge galvanized steel for reinforcement of walls.

F. Anchorage Devices: Power actuated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify rough-in utilities are in proper location.

3.2 INSTALLATION

A. Align and secure top and bottom runners at 24 inches oc. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

B. Install studs vertically at 16 inches oc.

C. Install furring vertically at 24 inches oc.

D. Align stud web openings horizontally.

E. Secure studs to tracks using fastener method. Do not weld.

F. Stud/furring splicing not permissible.

G. Brace stud framing system rigid.

H. Coordinate erection of studs/furring with requirements of door frames, window frames, and; install supports and attachments.

I. Backing: Secure 20 gauge fat strapping, width as required with minimum 0f 6 inches width to support of specialties, hardware, and opening frames.

J. Extend stud/furring framing to ceiling only. Attach ceiling runner securely to ceiling framing in accordance with details indicated.

K. Refer to Drawings for indication of partitions extending to finish ceiling only and for partitions extending through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Install extended leg ceiling runners.

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Indicated Position: 1/8 inch in 10 feet.

C. Maximum Variation from Plumb: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ceramic tile for wall applications; using thin-set application method; cementitious backer board as tile substrate; thresholds at door openings.

B. Related Sections:
1. Section 03 35 00 - Concrete Finishing: Troweling of floor slab for tile application.
2. Section 07 90 00 - Joint Protection.
3. Section 09 21 16 - Gypsum Board Assemblies: Metal studs for partitioning.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A108.1 - Installation of Ceramic Tile, A collection.
2. ANSI A108.1B - Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
3. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar -or- Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
4. ANSI A108.4 - Specifications for Ceramic Tile Installed with Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
5. ANSI A108.10 - Specifications for Installation of Grout in Tilework.
6. ANSI A118.4 - Latex-Portland Cement Mortar.
7. ANSI A118.6 - Ceramic Tile Grouts.
8. ANSI A118.9 - Test Methods and Specifications for Cementitious Backer Units.
9. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile.
10. ANSI A137.1 - Ceramic Tile.

B. Tile Council of America:
1. TCNA - Handbook for Ceramic Tile Installation.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit instructions for using grouts and adhesives.

C. Samples: Submit tile and grout samples

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Closeout Procedures

B. Operation and Maintenance Data: Submit recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with TCNA Handbook and ANSI A108 Series/A118 Series.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install adhesives and grouts in unventilated environment.

C. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.8 EXTRA MATERIALS

A. Section 01 77 00 - Closeout Procedures: Spare parts and maintenance products.

B. Supply 2% percent of each size, color, and surface finish of tile specified.

PART 2 - PRODUCTS

2.1 TILE

A. Manufacturers:
1. Dal Tile International, style: as specified on drawings
2. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPONENTS

A. Porcelain Wall Tile: conforming to the following:
1. Body Type: Porcelain
2. Moisture Absorption: 0 to 0.5 percent.
3. Size: As indicated on drawings
4. Shape: As indicated on drawings.
5. Edge: as indicated on drawings.
6. Surface Finish: As indicated on drawings.
7. Breaking Strength, ASTM C648: > 400 lbs
8. Scratch Hardness, MOHS: 6.5
9. Chemical Resistance, ASTM C650: Resistant
10. Dynamic C.O.F., ASTM A137.1: 0.42 min

11. Static C.O.F., ASTM C1028: Wet: ≥ 0.60, Dry: ≥ 0.70
12. Color: As indicated on drawings.

B. Base: as indicated on drawings.

2.3 ACCESSORIES

A. Adhesive Materials:
1. Organic Adhesive: ANSI A136.1 Type I; thin-set bond type.
2. Epoxy Adhesive: ANSI A118.3, thin-set bond type.
3. Tile Setting Adhesive: Elastomeric, waterproof, liquid applied.

B. Grout Materials:
1. Epoxy Grout: Basis of Design:
a. SPECTRALOCK® PRO
b. Color: 85 Almond
2. Substitutions: Section 01 60 00 - Product Requirements

C. Cleavage/waterproof Membrane: Schluter Kerdi-DS (or Similar)

D. Transitions:
1. Top of wall tile: Schluter Jolly
2. Tile base at floor: Schluter Dilex-AHKA

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify surfaces are ready to receive work.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install cementitious backer board. Tape joints and corners, cover with skim coat of dry-set mortar to feather edge.

E. Prepare substrate surfaces for adhesive installation.

3.3 INSTALLATION

A. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

B. Place thresholds and edge strips at exposed tile edges.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base and wall joints.

D. Place tile with joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
   1. Tile: 1/8 inch.

E. Form internal angles square and external angles bullnosed.

F. Install ceramic accessories rigidly in prepared openings.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep expansion or control joints free of adhesive or grout. Apply sealant to joints.

I. Allow tile to set for a minimum of 48 hours prior to grouting.

J. Grout tile joints. Use standard grout unless otherwise indicated.

K. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

L. Installation - Wall Tile:
   1. Over cementitious backer units install in accordance with TCNA Handbook Method W244, using membrane at toilet rooms, W223, organic adhesive.

3.4 CLEANING

A. Section 01 77 00 – Closeout Procedures: Final cleaning.

B. Clean tile and grout surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 73 00 - Execution: Protecting installed construction.

B. Do not permit traffic over finished floor surface for 4 days after installation.

3.6 SCHEDULES

A. Refer to Room Finish Schedule on the Drawings

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Acoustic panels
   2. Suspended metal grid ceiling system and perimeter trim

B. Related Requirements:
   1. Section 07 90 00 - Joint Protection

1.2 REFERENCE STANDARDS

A. ASTM International:
   1. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
   2. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
   4. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
   5. ASTM E580/E580M - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint
   6. ASTM E1264 - Standard Classification for Acoustical Ceiling Products

B. American Society of Civil Engineers:
   1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures

C. Ceilings and Interior Systems Construction Association:
   1. CISCA - Acoustical Ceilings: Use and Practice

1.3 SEQUENCING

A. Section 01 10 00 - Summary: Requirements for sequencing

B. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved

C. Install acoustic units after interior wet work is dry

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Product Data: Submit data on metal grid system components and acoustic units
   1. Indicate installation details required for seismic design loads

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Section 01 77 00 - Closeout Procedures: Requirements for maintenance materials

B. Extra Stock Materials:
   1. Furnish two percent of total acoustic unit area of extra panels to Owner

1.6 QUALITY ASSURANCE

A. Conform to CISCA requirements

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience

B. Installer: Company specializing in performing work of this section with minimum three years documented experience approved by manufacturer

1.8 AMBIENT CONDITIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation

B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic unit installation

PART 2 - PRODUCTS

2.1 SUSPENDED ACOUSTICAL CEILINGS

A. Manufacturer
   1. Armstrong World Industries, Inc. Style: Dune Angled Tegular and Optima Tegular
   2. CertainTeed Corporation.
   3. Chicago Metallic Corporation.
   4. USG Interiors, Inc.
   5. Substitutions: Section 01 60 00 - Product Requirements

B. Performance / Design Criteria:
   1. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360 of span.
   2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated according to ASCE 7 and applicable codes for Seismic Design Category.

2.2 COMPONENTS

A. Acoustic Panels (SAT-1): ASTM E1264, conforming to the following:
   1. Size 2'X4' X 3/4"
   2. Edge: Shadow Line Tapered
   3. Color: White
   4. Basis of Design: Olympia Micro Illusion- 4742
   5. Grid:
      a. Grid Basis of Design: USG Grid profile option – D USG DX
      b. Grid Materials: Commercial quality cold rolled steel with galvanized

coating
c. Exposed Grid Surface Width: 15/16”
d. Perimeter Molding Width: Minimum 7/8 inch
e. Grid Finish: White
f. Accessories: Stabilizer bars, clips, splices, perimeter moldings, and hold down clips required for suspended grid system and as required by applicable code for seismic design category

6. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified

B. Acoustic Panels (SAT-2): ASTM E1264, conforming to the following:
1. Size 2’X2’S3/4”
2. Edge: Shadow Line Tapered
3. Color: White
4. Basis of Design: Armstrong Cleanroom FL 1715
5. Grid:
a. Grid Basis of Design: 15/16 Armstrong Aluminum Clean Room
b. Grid Materials: Commercial quality cold rolled steel with galvanized coating
c. Exposed Grid Surface Width: 15/16”
d. Perimeter Molding Width: Minimum 7/8 inch
e. Grid Finish: White
f. Accessories: Stabilizer bars, clips, splices, perimeter moldings, and hold down clips required for suspended grid system and as required by applicable code for seismic design category
6. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified

C. Acoustic Panels, TECTUM: conforming to the following:
1. Basis of Design: Armstrong - TECTUM Direct-Attach Ceilings
2. Size 23 ¾” X 96” – Cut to length indicated on plans
3. Thickness: 2”
4. Edges: Long and Short Edges Beveled
5. Color: White
6. Mounting Method: A

2.3 ACCESSORIES

A. Classic Straight Perimeter Trim
1. Manufacturer: Armstrong Axiom Classic (Or Similar)
a. Straight Perimeter Trim
b. 2” Trim: White (WH) – Typical at SAT-1
c. 3” Trim: Color to match MCT – Typical at MCT

B. Touch-up Paint: Type and color to match acoustic and grid units

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Requirements for installation examination

B. Verify layout of hangers will not interfere with other work

3.2 DEMOLITION

A. Extend existing acoustical ceiling installations using materials and methods as specified

B. Clean and repair existing acoustical ceilings which remain or are to be reinstalled

3.3 INSTALLATION

A. Lay-In Grid Suspension System:
   1. Install suspension system in accordance with ASTM C635, ASTM C636 and as supplemented in this section
   2. Install suspension system in accordance with ASCE 7, ASTM E580/E580M and CISCA for applicable Seismic Zone
   3. Install system capable of supporting imposed loads with maximum deflection of 1/360 maximum
   4. Lay out system to balanced grid design with edge units no less than 50 percent of acoustic unit size
      a. Arrange system with long dimension of tile perpendicular to long dimension of the space unless noted on the drawings
   5. Locate system on room axis according to reflected plan
   6. Install after major above ceiling work is complete
      a. Coordinate location of hangers with other work
   7. Install hanger clips during steel deck erection
      a. Install additional hangers and inserts as required
   8. Hang suspension system independent of walls, columns, ducts, pipes and conduit
      a. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members
   9. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance
      a. Do not support hanger off of ducts
   10. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability
      a. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently
   11. Do not eccentrically load system, or produce rotation of runners
   12. Perimeter Molding:
      a. Install edge molding at intersection of ceiling and vertical surfaces
      b. Use longest practical lengths
      c. Miter corners
      d. Install at junctions with other interruptions
   13. Form expansion joints as detailed
      a. Form to accommodate plus or minus 1 inch movement
      b. Maintain visual closure

B. Acoustic Units:
   1. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function
   2. Lay directional patterned units one way with pattern parallel to shortest room axis. Fit border trim neatly against abutting surfaces
   3. Install units after above ceiling work is complete
   4. Install acoustic units level, in uniform plane, and free from twist, warp, and dents
   5. Cutting Acoustic Units:
      a. Cut to fit irregular grid and perimeter edge trim

b. Double cut and field paint exposed edges of tegular units.

6. Install hold-down clips to retain panels tight to grid system within 20 ft of exterior door

C. Tectum Units:

1. Install tight to bottom of metal building purlin
2. Refer to manufacturer for surface mounting and connections to bottom of purlin
3. Install units after above ceiling work is complete and mechanical, electrical, and plumbing rough-in is complete
4. Double cut and field paint exposed edges of tegular units.

3.4 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet

C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees

END OF SECTION

SECTION 09 54 23

LINEAR METAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Suspended metal grid ceiling system and perimeter trim
2. Linear, formed metal ceiling panels
3. Supplementary acoustical insulation over system units

B. Related Requirements:
1. Section 07 21 16 - Blanket Insulation.

1.2 REFERENCE STANDARDS

A. ASTM International:
1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
3. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
4. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
6. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
7. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
9. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
10. ASTM E580/E580M - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint

B. Ceilings and Interior Systems Construction Association:
1. CISCA - Acoustical Ceilings: Use and Practice

1.3 COORDINATION

A. Section 01 31 00 – Project Management and Coordination: Requirements for coordination

B. Coordinate Work of this section with installation of mechanical and electrical components and with other construction activities affected by Work of this section

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Product Data:
   1. Submit data for component profiles, materials, perimeter and integral trim, space closures, and maintenance materials
   2. Performance characteristics

C. Shop Drawings:
   1. Indicate ceiling system reflected plan, location of mechanical and electrical components, details of junction with dissimilar materials , and points of suspension
   2. Indicate installation details required for seismic design loads

D. Samples: Submit two samples 6x8 inch in size illustrating color and finish of exposed to view components

E. Manufacturer’s Certificate: Certify products meet or exceed specified requirements

1.5 QUALITY ASSURANCE

A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc.

B. Insulation Installed in Concealed Locations Surface Burning Characteristics:
   1. Batt Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84

C. Insulation Installed in Exposed Locations Surface Burning Characteristics: 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products

B. Accept factory-finished products on site in manufacturer's unopened factory packaging only; reject opened packages

C. Protect factory-finished products from damage to appearance by storing products in manufacturer's unopened factory packaging in dry storage area

1.8 WARRANTY

A. Section 01 77 00 – Closeout Procedures: Requirements for warranties

B. Furnish five year manufacturer warranty; include coverage for corrosion resistance and discoloration of surface finish

PART 2 - PRODUCTS

2.1 METAL CEILING SYSTEM

A. Manufacturers:
   1. Armstrong Corporation, Style Metalworks Tegular

2. Chicago Metallic Corporation
3. USG Interiors, Inc
4. CertainTeed, Inc.
5. Substitutions: Section 01 60 00 - Product Requirements

B. Performance / Design Criteria:
1. Installed Ceiling and Suspension System:
a. Support dead loads, including light fixtures, accessories, and indicated items, without eccentric loading of supports
b. Resist dead loads with maximum deflection of 1/360 of span
2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated according to ASCE 7 and applicable codes

2.2 COMPONENTS

A. Metal Panels (MCT): Steel sheet, ASTM A666 Type, 5/16” inch thick
1. Panel Size: 24” x 48”
2. Pattern Type Rectangle-Straight Lg 25427
a. 27% Open
3. Edge: Square Tegular
4. Finish: Gun metal Grey
5. Grid: 15/16” Suspended Grid

B. Edge Molding, Expansion Joints, and Splices: Same material, thickness, and finish as linear panels

C. End Caps: Manufacturers standard; same color and finish as sight-exposed surfaces of linear panels

D. Space Closures: Manufacturers standard sections, color as selected; snap fit between exposed linear panels

E. Accessories: Stabilizer bars, clips, hold down clips, and other items as required for suspended grid system; sight-exposed surfaces same color and finish as sight-exposed surfaces of linear panels

F. Suspension Members: Formed steel sections, with integral attachment points; primed finish; size and type to suit application and ceiling system flatness requirement specified

G. Suspension Wire: Steel, annealed, galvanized finish, 9-gage diameter. size and type for application, seismic requirements, and ceiling system flatness requirement specified

H. Light Fixtures: Fabricated to fit system, requiring no interruption of suspension components, and independently suspended

I. Touch-up Paint For Concealed Items: Type recommended by Manufacturer

2.3 FABRICATION

A. Shop cut linear panels to accommodate mechanical and electrical items

B. Form internal and external corners of same material, thickness, finish, and profile to match exposed linear panels; back brace internal corners

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Requirements for installation examination

B. Verify existing conditions before starting work

C. Verify that substrate and field conditions are acceptable for installation, in accordance with manufacturer's installation instructions

D. Verify layout of hangers do not interfere with other work

E. Verify required utilities are available, in proper location, and ready for use

F. Verify field measurements are as indicated

3.2 INSTALLATION

A. Suspension Components:
1. Install after above ceiling work is complete in accordance with ASTM C635, ASTM C636 and as supplemented in this section
2. Install suspension system in accordance with ASCE 7, ASTM E580/E580M and CISCA for applicable Seismic Zone
3. Hang carrying members independent of walls, columns, ducts, light fixtures, pipe, and conduit; where carrying members are spliced, avoid visible displacement of face panels with adjacent panels
4. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest adjacent hangers to span required distance
5. Locate suspension system for linear panel layout on room axis

B. Panels:
1. Install linear panels and other system components in accordance with manufacturer's instructions
2. Align end joints
3. Butt interior end joints tight.
4. Provide expansion joints to accommodate plus or minus 1 inch movement and maintain visual closure
5. Install recessed space closures between linear panels at interior locations
6. Install edge moldings at intersections of ceiling, junctions with other finishes, and at vertical surfaces; use maximum piece lengths
7. Install end caps at sight-exposed ends of linear panels
8. Field miter corners. or Install prefabricated corner sections at contractor option
9. Exercise care when site cutting sight-exposed finished components to ensure surface finish is not defaced

3.3 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances

B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet

C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees

D. Maximum Variation From Dimensioned Position: 1/4 inch

3.4 CLEANING

A. Section 01 77 00 – Closeout Procedures: Requirements for cleaning

B. Remove protective coating or film

C. Clean surfaces

D. Replace damaged or abraded components

END OF SECTION

SECTION 09 65 00

RUBBER BASE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes resilient base and accessories.

1.2 REFERENCES

A. ASTM International:
1. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile.
2. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile.
3. ASTM F1861 - Standard Specification for Resilient Wall Base.

B. Federal Specification Unit:
1. FS L-F-475 - Floor Covering Vinyl, Surface (Tile and Roll), with Backing.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Samples:
1. Submit manufacturer's complete set of color samples for initial selection.
2. Submit samples, 6 x 6 inch in size illustrating color and pattern for each resilient flooring product specified.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience and manufacturer certified installer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

C. Store materials for not less than 48 hours prior to installation in area of installation at temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.8 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish one carton of flooring, 25 lineal feet of base, and 2 percent of installed stair materials of each type and color specified.

PART 2 PRODUCTS

2.1 RESILIENT BASE

A. Manufacturers:
1. Roppe Corp.
2. Johnsonite
3. Substitutions: Section 01 60 00 - Product Requirements.

B. Base: ASTM F1861 Rubber; coved style
1. Height: 4 inch
2. Length: roll
3. Accessories: Pre-molded external corners.
4. Color: Johnsonite Baseworks Thermoset Rubber, Burnt Umber 63

2.2 ACCESSORIES

A. Subfloor Filler: type recommended by adhesive material manufacturer.

B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

C. Moldings and Edge Strips: Same material as flooring.

D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify floor and lower wall surfaces are free of substances capable of impairing adhesion of new adhesive and finish materials.

3.2 PREPARATION

A. Clean substrate.

B. Apply primer as required to prevent "bleed-thru" or interference with adhesion by substances cannot be removed. Apply primer to surfaces.

3.3 INSTALLATION - BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use pre-molded units. At exposed ends, use pre-molded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.4 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Remove excess adhesive from floor, base, and wall surfaces without damage.

C. Clean, seal, and maintain resilient flooring products.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.

3.6 SCHEDULE

A. Refer to Room Finish Schedule on Drawings

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes carpet tile, loose laid with edges and control grid adhered.

B. Related Sections:
1. Section 03 35 00 - Concrete Finishing: Finish floor slab.
2. Section 09 65 00 - Resilient Flooring: Base finish.

1.2 REFERENCES

A. Carpet and Rug Institute:
1. CRI Green Label Plus Testing Program.

B. Consumer Products Safety Commission:
1. CPSC 16 CFR 1630 - Standard for the Surface Flammability of Carpets and Rugs.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on specified products, describing physical characteristics; sizes, patterns, colors available, and method of installation.

C. Samples:
1. Submit four carpet tiles illustrating color and pattern design for each carpet color selected. Matching roll carpet samples.
2. Submit six inch long samples of edge strip.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience approved by manufacturer.
1. FCIB or IFCI certified carpet installers.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Store materials in area of installation for 48 hours prior to installation.

1.7 EXTRA MATERIALS

A. Section 01 78 23 – Operation and Maintenance Data: Spare parts and maintenance products.

B. Supply 18 carpet tiles of each color and pattern selected or no more than 2% of each.

PART 2 PRODUCTS

2.1 CARPET TILE

A. Manufacturers:
1. Mohawk Group
2. Substitutions: Section 01 60 00 - Product Requirements

B. Components
1. Carpet Tile (CPTT-1): Mohawk Group
a. Style: Riot- BT355
b. Color: Leather Jacket
c. Color #: 999
d. Collection: renegade
e. Construction Type: Tufted
2. Walk-off Tile (WOMC-1): Mohawk Group
a. Style: First Step II -GT315
b. Color: Cobalt
c. Color #: 955
d. Collection: Tuff Stuff II Walk Off Tile
e. Construction Type: Walk-Off Tile

2.2 ACCESSORIES

A. Sub-Floor Filler: Type recommended by flooring material manufacturer.

B. Moldings and Edge Strips: Schluter,
1. Manufacture: Schluter
2. Model: RENO-U
3. Finish: Satin Nickel

C. Contact Adhesive: Recommended by carpet manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify floor surfaces are smooth and flat within tolerances specified in Section 03 35 00 and are ready to receive work.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Clean and vacuum substrate.

3.3 INSTALLATION

A. Moisture Testing: Conduct subfloor moisture testing in accordance to the ASTM F-2170 (in-situ Relative Humidity) and/or ASTM F-1869 (Anhydrous Calcium Chloride).

B. Install carpet tile in accordance with CRI 104.

C. Do not mix carpet from different cartons unless from same dye lot.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Install carpet tile in brick pattern, with pile direction alternating to next unit according to pattern selected by Architect set parallel to building.

F. Locate change of color or pattern between rooms under door centerline.

G. Adhere carpet tile with self-stick adhesive backing by removing protective membrane and pressing tile back onto clean and dry substrate.

H. Trim carpet tile neatly at walls and around interruptions.

I. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

A. Section 01 77 00 - Closeout Procedures: Final cleaning.

B. Remove excess adhesive from floor, base, and wall surfaces without damage.

C. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and field application of paints, stains, varnishes, and other coatings

B. Related Sections:
1. Section 05 50 00 - Metal Fabrications: Shop primed items
2. Section 09 21 16 - Gypsum Board Assemblies: Texturing Gypsum Board Walls

1.2 REFERENCES

A. ASTM International:
1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications
2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials
3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

B. Green Seal:
1. GS-03 - Anti-Corrosive Paints.
2. GS-11 - Paints and Coatings.

C. Painting and Decorating Contractors of America:
1. PDCA - Architectural Painting Specification Manual

D. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual

1.3 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Product Data: Submit data on finishing products and special coating

C. Samples:
1. Submit paper chip samples illustrating range of colors and textures available for each surface finishing product scheduled

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures

B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces

C. Provide a minimum of one gallon of each paint color and finish for owners attic stock.

1.6 QUALITY ASSURANCE

A. Surface Burning Characteristics:
   1. Fire Retardant Finishes: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience

B. Applicator: Company specializing in performing work of this section with minimum five years documented experience

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements

B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability

C. Container Label Include:
   1. Manufacturer's Name
   2. Type of Paint
   3. Brand Name
   4. Lot Number
   5. Brand Code
   6. Coverage
   7. Surface Preparation
   8. Drying Time
   9. Cleanup Requirements
   10. Color Designation
   11. Instructions for Mixing and Reducing

D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer

C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions

F. Provide lighting level of 80 ft candle measured mid-height at substrate surface

1.10 SEQUENCING

A. Section 01 10 00 - Summary: Work sequence

B. Sequence application to the following:
   1. Do not apply finish coats until paintable sealant is applied
   2. Back prime wood trim before installation of trim

1.11 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds

B. Furnish five year manufacturer warranty for paints and coatings

1.12 EXTRA MATERIALS

A. Section 01 78 23 – Operation and Maintenance Data: Spare parts and maintenance products

PART 2 - PRODUCTS

2.1 PAINTS AND COATINGS

A. Manufacturers:
   1. Benjamin Moore & Co
   2. Columbia Paint & Coatings
   3. Devoe Paint Company
   4. Kwal Paint
   5. PPG Architectural Finishes, Inc
   6. Sherwin Williams Paint Co
   7. Substitutions: Not Permitted

2.2 COMPONENTS

A. Coatings: Ready mixed, except field catalyzed coatings
   1. Prepare coatings:
      a. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating
      b. For good flow and brushing properties
      c. Capable of drying or curing free of streaks or sags

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality

C. Patching Materials: Latex filler

D. Fastener Head Cover Materials: Latex filler

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Verify surfaces and substrate conditions are ready to receive Work as instructed by product manufacturer

C. Examine surfaces scheduled to be finished prior to commencement of work
   1. Report conditions capable of affecting proper application

D. Test shop applied primer for compatibility with subsequent cover materials

E. Measure moisture content of surfaces using electronic moisture meter
   1. Do not apply finishes unless moisture content of surfaces are below the following maximums:
      a. Plaster and Gypsum Wallboard: 12 percent
      b. Masonry, Concrete, and Concrete Unit Masonry: 12 percent
      c. Interior Wood: 15 percent, measured in accordance with ASTM D4442
      d. Concrete Floors: 8 percent

3.2 PREPARATION

A. Aluminum Surfaces Scheduled for Paint Finish:
   1. Remove surface contamination by steam or high pressure water
   2. Remove oxidation with acid etch and solvent washing
   3. Apply etching primer immediately following cleaning

B. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish:
   1. Remove foreign particles to permit adhesion of finishing materials
   2. Apply compatible sealer or primer

C. Insulated Coverings:
   1. Remove dirt, grease, and oil from canvas and cotton

D. Concrete Floors:
   1. Remove contamination, acid etch, and rinse floors with clear water
   2. Verify required acid-alkali balance is achieved
   3. Allow to dry.

E. Copper Surfaces Scheduled for Paint Finish:
   1. Remove contamination by steam, high pressure water, or solvent washing
   2. Apply vinyl etch primer immediately following cleaning.

F. Copper Surfaces Scheduled for Natural Oxidized Finish:
   1. Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid
   2. Rub on repeatedly for required effect
   3. Once attained, rinse surfaces with clear water and allow to dry

G. Gypsum Board Surfaces:
   1. Fill minor defects with filler compound
   2. Spot prime defects after repair

H. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent
   2. Apply coat of etching primer

I. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish:
   1. Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter
   2. Remove oil and grease with solution of tri-sodium phosphate
      a. Rinse well and allow to dry
   3. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water
      a. Allow to dry.

J. Plaster Surfaces:
   1. Fill hairline cracks, small holes, and imperfections with latex patching plaster
   2. Make smooth and flush with adjacent surfaces
   3. Wash and neutralize high alkali surfaces

K. Uncoated Steel and Iron Surfaces:
   1. Remove grease, mill scale, weld splatter, dirt, and rust
   2. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent
   3. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned
   4. Spot prime paint after repairs

L. Shop Primed Steel Surfaces:
   1. Sand and scrape to remove loose primer and rust
   2. Feather edges to make touch-up patches inconspicuous
   3. Clean surfaces with solvent
   4. Prime bare steel surfaces

M. Interior Wood Items Scheduled to Receive Paint Finish:
   1. Wipe off dust and grit prior to priming
   2. Seal knots, pitch streaks, and sappy sections with sealer
   3. Fill nail holes and cracks after primer has dried; sand between coats

N. Interior Wood Items Scheduled to Receive Transparent Finish:
   1. Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer
   2. Fill nail holes and cracks after sealer has dried; sand lightly between coats

O. Wood Doors Scheduled for Painting:
   1. Seal wood door top and bottom edge surfaces with clear sealer

P. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces

Q. Exterior Wood
   1. Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer
   2. Fill nail holes and cracks after sealer has dried; sand lightly between coats

3.3 APPLICATION

A. Do not apply finishes to surfaces that are not dry
   1. Allow applied coats to dry before next coat is applied

B. Apply each coat to uniform appearance
   1. Apply each coat of paint slightly darker than preceding coat unless specified otherwise

C. Sand wood and metal surfaces lightly between coats to achieve required finish

D. Vacuum clean surfaces of loose particles
   1. Use tack cloth to remove dust and particles just prior to applying next coat

E. Where clear finishes are required, tint fillers to match wood
   1. Work fillers into grain before set
   2. Wipe excess from surface.

F. Prime concealed surfaces of interior and exterior woodwork with primer paint

G. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner

H. Finishing Mechanical And Electrical Equipment:
   1. Paint shop primed equipment

2. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately
3. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports except where items are shop finished
4. Paint interior surfaces of air ducts and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint to visible surfaces
5. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels
6. Paint exposed conduit and electrical equipment occurring in finished areas
7. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment
8. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing

3.5 CLEANING

A. Section 01 77 00 – Closeout Procedures: Final cleaning

B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site

3.6 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

A. Metal Fabrications (Section 05 50 00).

3.7 SCHEDULE - EXTERIOR SURFACES

A. Pavement Markings:
   1. Two coats of solvent based acrylic copolymer paint, yellow

B. Exposed Concrete Masonry Units,
   1. Two coats of 100% clear waterproof sealer

C. Exposed Veneer Brick Units,
   1. Two coats of 100% clear waterproof sealer

D. Steel - Unprimed:
   1. One coat of alkyd primer
   2. Two coats of alkyd enamel, gloss or semi-gloss

E. Steel - Shop Primed:
   1. Touch-up with zinc chromate primer.
   2. Two coats of alkyd enamel, gloss or semi-gloss

F. Steel - Galvanized:
   1. One coat galvanize primer
   2. Two coats of alkyd enamel, gloss or semi-gloss

G. Aluminum - Mill Finish:
   1. One coat etching primer
   2. Two coats of alkyd enamel, gloss or semi-gloss

H. Wood - Transparent:
1. Filler coat (for open grained wood only)
2. One coat of stain
3. Two coats of varnish, gloss

3.8 SCHEDULE - INTERIOR SURFACES

A. Wood - Painted:
1. One coat of alkyd prime sealer
2. Two coats of pre-catalyzed water-based epoxy, gloss or semi-gloss

B. Wood - Transparent:
1. Filler coat (for open grained wood only)
2. One coat of stain
3. Two coats of varnish, gloss

C. Concrete, Concrete Masonry Units Painted:
1. One coat of block filler
2. Two coats of latex, semi-gloss

D. Concrete Masonry Units (Not Painted),
1. Two coats of 100% clear waterproof sealer

E. Steel - Unprimed:
1. One coat of latex primer
2. Two coats of pre-catalyzed water-based epoxy, gloss or semi-gloss

F. Steel - Primed:
1. Touch-up with latex primer.
2. Two coats of pre-catalyzed water-based epoxy, gloss or semi-gloss

G. Steel - Galvanized:
1. One coat galvanize primer
2. Two coats of pre-catalyzed water-based epoxy, gloss or semi-gloss

H. Aluminum - Mill Finish:
1. One coat etching primer
2. Two coats of pre-catalyzed water-based epoxy, gloss or semi-gloss

I. Gypsum Board Walls and Ceilings:
1. One coat of latex primer sealer
2. Two coats latex acrylic enamel, egg shell

END OF DIVISION

DIVISION 10 SPECIALTIES

SECTION 10 11 00

VISUAL DISPLAY SURFACES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes markerboards.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A135.4 - Basic Hardboard.
2. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. ASTM International:
1. ASTM A424 - Standard Specification for Steel, Sheet, for Porcelain Enameling.
2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
4. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
5. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board.

C. Federal Specification Unit:
1. FS CCC-W-408 - Wall Covering, Vinyl-Coated.
2. FS L-P-1040 - Plastic Sheets and Strips (Polyvinyl Fluoride).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate wall elevations, dimensions, and joint locations, and special anchor details.

C. Product Data: Submit data on markerboards, tackboards, tackboard surface covering, and trim and accessories.

D. Samples: Submit two 2 x 2 inch in size illustrating materials and finish, color and texture of tackboard, and tackboard surfacing.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures.

B. Operation and Maintenance Data: Submit Operation and Maintenance Data.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section

with minimum three years documented experience.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 WARRANTY

A. Section 01 77 00 – Closeout Procedures: Warranties.

B. Furnish five year manufacturer warranty for visual display boards.

C. Warranty: Include coverage of markerboard surface from discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.1 VISUAL DISPLAY BOARDS

A. Manufacturers:
1. Alliance America
2. Claridge Products and Equipment
3. Ghent Manufacturing Inc.
4. Polyvision
5. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. Sheet Steel: ASTM A424, Type I, commercial quality.

B. Aluminum Sheet: ASTM B209; 6063 alloy, T52 temper.

C. Hardboard: ANSI A135.4, Tempered type, pre-treat surface for chalkboard paint.

D. Cork: Fine grain natural cork, homogeneous composition.

E. Tackboard Covering: FS CCC-W-408; Type III - heavy; Class 2 - mildew resistant; color as selected; clear top overcoat of polyvinyl fluoride in accordance with FS L-P-1040 Type 1, Grade B, Class 2, 0.0005 inch thick.

F. Plywood: APA Structural I, Grade C-D, fir species.

G. Particleboard: ANSI A208.1, wood chips, shavings, flakes, set with waterproof resin binder, sanded faces.

H. Interior Composite Wood Products: Contain no added urea-formaldehyde resins.

I. Foil Backing: Aluminum foil sheet, .0015mil thick.

J. Frame and Chalk rail: Aluminum extrusions, ASTM B221, 6061 alloy, T52 temper.

2.3 ACCESSORIES

A. Adhesives: Type used by manufacturer.

B. Map Supports: Formed aluminum sliding hooks, roller brackets, to fit map rail.

C. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

D. Cleaning Instruction Plate: Provide instructions for chalkboard cleaning on metal plastic plate fastened to perimeter frame near chalk rail.

2.4 FABRICATION

A. Outer Face Sheet: Steel, 28 gage thick. or Aluminum.

B. Outer Facing: Cork, 1/4 inch thick.

C. Core: Plywood and Particle board,1/2 inch thick.

D. Backing Surface: Aluminum foil, 0.005 inch thick.

E. Splice Joint: Concealed spline of sheet steel.

F. Aluminum Frame: concealed fasteners, map rail with cork insert over markerboard, and tackboard surfaces.

G. Aluminum Chalk rail: one piece full length of chalkboard, molded closed ends; concealed fasteners.

2.5 FACTORY FINISHING

A. Porcelain Enamel: Glass fibered enamel, baked to vitreous surfaces; Porcelain Enamel Institute Type A; color as selected.

B. Tackboard Surface: Vinyl of color as selected.

C. Aluminum Frame, Chalk rail, and Accessories: Anodized finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify internal wall blocking is ready to receive Work and positioning dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Establish top of chalk rail at 30 inches above finished floor.

B. Secure units level and plumb.

C. Markerboards: Butt panels tight with concealed spline to hairline joint.

3.3 CLEANING

A. Section 01 77 00 - Closeout Procedures: Final cleaning.

B. Cover chalkboard surfaces with protective cover, taped to frame.

C. Remove temporary protective cover at date of Substantial Completion.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes interior and exterior signs.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.

C. Samples: Submit two signs, large enough in size illustrating type, style, letter font, and colors specified; method of attachment.

D. Manufacturer's Installation Instructions: Submit installation template and attachment devices.

1.3 QUALITIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Package signs, labeled in name groups.

C. Store adhesive attachment tape at ambient room temperatures.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

D. Do not install signs when ambient temperature is lower than recommended by manufacturer.

E. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.1 EXTERIOR SIGNAGE

A. Fabricated letters: Fabricate letters to comply with requirements indicated below and as indicated on drawings.
   1. Manufacturers:
      a. Gemini Incorporated
      b. Impact Signs

c. Substitutions: Section 01 60 00 Product Requirements

2. Form letters by heliarc welding process or soldering process depending on material chosen. Produce characters with smooth flat faces, sharp corners, precisely formed lines and profiles, free from pits, scale, sand holes and other defects. Apply anchoring devices into individual letters as required for anchorage.

3. Characteristics:
   a. Metal: Painted Aluminum
   b. Size: As indicated on the drawings
   c. Thickness ¼ inch
   d. Letter style: As indicated on drawings
   e. Finish: Selected from manufactures full range of finishes
   f. Faces: metal
   g. Text: As indicated on the drawings.
   h. Mounting: detachable stud with removable stand-offs

B. Template: Provide full size paper mounting template showing hole placement and location of mounting holes.

C. Finishes: Colors and surface textures for exposed letters as selected by the architect from the manufacturer's standards.

2.2 INTERIOR SIGNS

A. Engraved Signs: Laminated colored plastic; lettering engraved through face to expose core color, refer to drawing sheets A711, A712, and A713 for further detail:
   1. Face Color: Color as selected by Architect.
   2. Core Color: White
   1. Total Thickness: 1/8 inch.
   2. Sign Height: As indicated on sheet A711, A712, and A713
   3. Edges: Square
   4. Character Font: Segoe UI
   5. Character Case: Upper case.
   6. Text Height. As indicted on drawing detail
   7. Provide Braille on each sign

C. Graphic Style: Handicapped type.

B. See details on drawings for sign types.

2.3 ACCESSORIES

A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

3.2 INSTALLATION

A. Install signs after door surfaces are finished, in locations indicated on Drawings.

B. See mounting elevations on Drawing Sheet A701.

3.3 SCHEDULES

A. See Signage Schedule on Drawing Sheet A701.

B. Room Signs Called out on Drawing Sheet A711, A712, and A713

C. Service Room Signs: Plaque signs, face color as indicated on drawings, "UTILITY ROOM", SERVICE ROOM", and "ELECTRICAL ROOM"; at each respective room location.

END OF SECTION

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid plastic HDPE toilet compartments including the following:
   1. Floor mounted overhead-braced toilet compartments.
   2. Urinal screens: floor anchored

1.2 RELATED SECTIONS

A. Section 06 10 53 - Miscellaneous Rough Carpentry

B. Section 09 21 16 - Gypsum Board Assemblies

C. Section 09 22 16 - Non-Structural Metal Framing

D. Section 09 30 00 - Tiling

1.3 REFERENCES

A. ASTM B 85 - Standard Specification for Aluminum-Alloy Die Castings.

B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Provide layout drawings and installation details with location and type of hardware required.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Performance Requirements:
1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
a. Class B flame spread/smoke developed rating, tested to ASTM E84.
2. Material Fire Ratings:
b. National Fire Protection Association (NFPA) 286: Pass.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer’s absolute limits.

1.8 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 10 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Bradley Corp.

B. Bobrick

C. ASI Group

D. Metpar Corp.

E. Substitutions: Section 01 60 00 - Product Requirements.

2.2 MATERIALS

A. Substrate Material:
1. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface, Class C
a. Color:
1) Charcoal Gray

b. Dividing Panel Size: Panel up to 84-inches deep to be one-piece panel, 72 inches Tall and 9" AFF.

2. Toilet Compartments:
   a. Configuration: Floor-anchored, overhead-braced toilet cubicles.
   b. Basis of Design: Bradley Corp- Bradmar Partitions
      1) Door Hardware and Pedestal: clear anodized aluminum
      2) Height: overall height from finished floor to top of headrail is 81-inches consisting of 9-inch floor clearance, 69-inch doors, and 1-inch headrail.
3. Fire Resistance:
   a. Class C
      1) Flame Spread Index (ADTM E84): Between 26 and 75 for panels, doors, and fascia panels.
      2) Smoke Developed Index (ASTM 84): No more than 450 for panels, doors and fascia panels.
      3) National Fire Protection Association/International Building Code Interior Wall and Ceiling Finish: Class C
      4) Uniform Building Code: Class 2
4. Urinal Privacy Screen:
   a. Basis of Design: Bradley Corp- Bradmar Partitions
   b. Configuration: Floor anchored
   c. Screen Size:
      1) Max Height: 72-inch
      2) Max Width: 24-inch
   d. Hardware: 9-inch pedestal, urinal screen hardware to match cubicle hardware.
5. Finished Thickness:1- inch for fascia panels, doors, and panels.
6. Frame:
   a. Headrail: secured to the top of the fascia for stability
   b. Mounting Brackets and Fasteners: Clear anodized aluminum U-Channel brackets.
   c. Privacy:
      1) Full-length clear anodized aluminum frame provides built-in, no sightline privacy on hinge and keeping-sides of the door.
      2) Continuous clear anodized aluminum U-Channels fasten divider and fascia panels to the wall.
7. Hardware:
   a. Compliance
      1) Door handle is operable with one hand, without tight grasping, pinching, or twisting of the wrist, and force to operate does not exceed 5 pounds.
      2) Floor clearance: 9-inch high minimum clearance maintained under fascia panel and side divider panels.
      3) Keyed emergency access: latch allows door to be opened from the outside of the compartment with keyed emergency release slot in the indicator.
      4) Fastening: Hardware secured to door and fascia by stainless steel sheet metal screws.
      5) Door closing: Self-closing continuous spring loaded type adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door.
      6) Door hardware type:
         a) Locking: clear anodized aluminum door handle locates directly into the vertical keeping extrusion. Integral rubber door bumper cushions doors when closing.
         b) Occupancy indicator: Clear anodized aluminum circular escutcheon with

red and white indicator.

c) Pedestal: Cylindrical pedestal supports divider panels and maintains a 9-inch high floor clearance under fascia panel and side divider panels and includes (+/-) 1-inch adjustment.

d) Robe hook: Clear anodized aluminum in matte finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install partitions rigid, straight, plumb, and level.

C. Locate bottom edge of doors and panels 9 inches above finished floor.

D. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).

E. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

F. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 ADJUSTING

A. Adjust doors and latches to operate correctly.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10 22 27

OPERABLE PANEL PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes folding panel acoustic partition; ceiling track, ceiling guards, and operating hardware;

B. Related Sections:
1. Section 05 12 00 - Structural Steel Framing.
2. Section 06 20 00 - Finish Carpentry.
3. Section 09 51 13 - Acoustical Panel Ceilings.

1.2 REFERENCES

A. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
2. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
3. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
4. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings
5. ASTM E413 - Classification for Rating Sound Insulation
6. ASTM E557 - Standard Guide for The Installation of Operable Partitions
7. ASTM E596 - Standard Test Method for Laboratory Measurement of the Noise Reduction of Sound-Isolating Enclosures

B. Federal Specification Unit:
1. FS CCC-W-408 - Wall Covering, Vinyl-Coated

C. National Electrical Manufacturers Association:
1. NEMA LD 3 - High Pressure Decorative Laminates
2. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls
3. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

D. National Fire Protection Association:
1. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls, Method B
2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Wall and Ceiling Interior Finish

E. Underwriters Laboratories Inc.:
1. UL - Fire Resistance Directory

1.3 PERFORMANCE REQUIREMENTS

A. Sound Transmission Classification (STC): As specified, calculated in accordance with

ASTM E413, based on tests performed in accordance with ASTM E90, on partition size of 100 sq ft

B. Field Sound Transmission Classification (FSTC): As specified, calculated in accordance with ASTM E413, based on tests performed in accordance with ASTM E336, on partition size of 100 sq ft

C. Noise Isolation Classification (NIC): As specified, calculated in accordance with ASTM E413, based on tests performed in accordance with ASTM E596

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Shop Drawings: Indicate opening sizes, track layout, details of track and required supports, static and dynamic loads, adjacent construction and finish trim, and stacking sizes

C. Product Data: Submit data on partition operation, hardware and accessories, electric operating components, colors and finishes available

D. Samples for Review: Submit two samples of surface finish, 12 x 12 inches size, illustrating quality, colors selected, and texture

E. Manufacturer's Instructions: Submit special procedures, perimeter conditions requiring special attention, and installation sequence

F. Certificates: Certify partition system meets or exceeds specified acoustic requirements

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures: Closeout Submittals

B. Operation and Maintenance Data:
1. Submit recommended cleaning methods, cleaning materials, and stain removal methods
2. Describe cleaning materials detrimental to vinyl fabric tackboard, markerboard surfaces, and hardware finish

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience

B. Installer: Company specializing in performing work of this section with minimum three years documented experience approved by manufacturer

1.7 COORDINATION

A. Section 01 73 00 – Execution

B. Coordinate Work with other sections providing panel finish materials to this section

C. Coordinate installation of electric service

PART 2 - PRODUCTS

2.1 OPERABLE PANEL PARTITIONS

A. Manufacturers:

1. Hufcor, Inc
2. Modernfold, Inc
3. Panelfold Inc, Acousti-Seal
4. Substitutions: Section 01 60 00 - Product Requirements

2.2 COMPONENTS

A. Partition Construction: Side opening; continuous hinged panels; side stacking
   1. Sound Transmission Class (STC): 50 min
   2. Operation: Manual Operation
   3. Finish: Vinyl

B. Panels:
   1. Panel Substrate Facing: Steel sheet, 21 gage thick
   2. Core: 16 gage formed sheet steel frame top, bottom, jambs, and intermediates; welded construction, internally reinforced at suspension points, with acoustical insulation fill
   3. Thickness: 4 1/4 inches
   4. Hinges: butt full leaf type, steel
   5. Panel to Panel Seals: Grooved and gasketed astragals; continuous flexible ribbed vinyl seal fitted to panel edge construction; color to match panel finish
   6. Panel width: maximum width to fit within pocket indicated on drawings.

C. Track: Extruded aluminum; manufacturer standard size, thickness and profile designed to support loads with maximum deflection of 1/360 of span; steel sub-channel

D. Carriers: Ball bearing, steel wheels on trolley carrier at top of every panel, sized to carry imposed loads, with threaded pendant bolt for vertical adjustment

E. Hardware: Latching door handles of cast steel, satin chrome finish

F. Acoustic Seals: Flexible acoustic seals at jambs, ceilings, retractable floor and ceiling seals, and above track to structure acoustic seal

G. Accessories: White enameled ceiling closure, aluminum jamb and head molding, fittings and attachments

H. Pocket Enclosures: Door, frame, and trim to match adjacent walls

I. Acoustic Sealant: Manufacturer's standard

2.3 FACTORY FINISHING

A. Vinyl Coated Fabric:
   1. Basis of Design: Modernfold - Standard Len-Tex Vinyl, Soraya, Serenity
      a. Hinge Color: Smoke Gray (SW7668)
      b. Trim Color: Smoke Gray (SW7668)

2.4 OPTIONS

A. Available accessories/options:
   1. Pocket doors: same construction, finish and appearance as the adjacent panels. Equipped with electric interlock system.
   2. Intersecting partition interface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution

B. Verify field measurements are as indicated on drawings

C. Verify required utilities are available, of correct characteristics, in proper location, and ready for use

D. The following tolerances shall supersede tolerance specified in other sections
   1. Verify track supports are laterally braced and will permit track to be level within 1/4 inch of required position and parallel to floor surface
   2. Verify floor flatness of 1/8 inch in 10 feet, non-cumulative
   3. Verify wall plumbness of 1/8 inch in 10 feet, non-cumulative

3.2 INSTALLATION

A. Install partition in accordance with ASTM E557

B. Fit and align partition assembly and pocket doors level and plumb

C. Lubricate moving components

D. Apply acoustic sealant to achieve required acoustic performance

E. Field apply surface finishes

3.3 ADJUSTING

A. Section 01 73 00 - Execution: Starting and Adjusting

B. Adjust partition assembly to provide smooth operation from stacked to full open position. Do not over-compress acoustic seals

C. Visually inspect partition in full extended position for light leaks to identify potential acoustical leak

D. Adjust partition assembly to achieve lightproof seal

3.4 CLEANING

A. Section 01 77 00 - Closeout Procedures: Final cleaning

B. Clean finish surfaces and partition accessories

C. Condition markerboard surfaces

3.5 DEMONSTRATION AND TRAINING

A. Demonstrate operation of partition, identify potential operational problems.

3.6 SCHEDULES

A. See doors located in Commons 102 and Classroom 103, see Drawings for details.

END OF SECTION

SECTION 10 26 00

WALL AND DOOR PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Corner Guards.

B. Related Sections:
1. Section 06 10 53 - Miscellaneous Rough Carpentry: Support blocking for wall and corner guard anchors.
2. Section 09 21 16 - Gypsum Board Assemblies: Installation of gypsum board walls.

1.2 PERFORMANCE REQUIREMENTS

A. Installed Wall Rail Component Assembly: Support vertical live load of 100 lb/lineal ft with deflection not to exceed 1/50 of span between supports.

B. Installed Component Assembly: Resist lateral force of 75 lbs at any point without damage or permanent set.

C. Corner Guards: Resist lateral impact force of 100 lbs at any point without damage or permanent set.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.

C. Samples: Submit two samples illustrating component design, configuration, color and finish.

1.4 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.5 COORDINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Coordinate Work with wall or partition sections for installation of concealed blocking or anchor devices.

PART 2 PRODUCTS

2.1 WALL AND CORNER GUARDS

A. Manufacturers:
1. The Corner Guard Store
2. C/S Group, Acrovyn
3. Arden Architectural Specialties Inc.
4. InPro Corporation
5. Koroseal Wall Protection Systems, Inc
6. Pawling Corp.
7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. Corner Guard: 2 inch legs, 1/8 inch radiused corner
1. Material: Stainless steel type 304 finish, 18 gauge.
2. Mounting: Surface mounted w/polyurethane construction adhesive.
3. Length: 96" one piece.
4. Finish: #4 satin
5. Model: CG-SS4-18482-90.
6. Corner Angles: verify and special order as required

B. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

2.3 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

2.4 FACTORY FINISHING

A. Corner Guard: Color as selected.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify rough-in for components are correctly sized and located.

3.2 INSTALLATION

A. Position corner guard 8 inches above finished floor to 52 inches high.

B. Install per manufacturer's instructions

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation from Required Height for Horizontal Rails: ¼ inch.

C. Maximum Variation from Level or Plane For Visible Length for Horizontal Rails: ¼ inch.

END OF SECTION

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes toilet accessories; shower and tub accessories; and utility room accessories.

B. Related Sections:
1. Section 06 10 53 - Miscellaneous Rough Carpentry: In-wall framing and plates for support of accessories.
2. Section 09 22 16- Non-Structural Metal framing: Placement of blocking and backing plate reinforcement.
3. Section 09 30 00 - Tiling: Ceramic washroom accessories.
4. Section 10 21 13 - Toilet Compartments.

1.02 REFERENCES

A. ASTM International:
1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
4. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
6. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
7. ASTM C1036 - Standard Specification for Flat Glass.

B. Federal Specification Unit:
1. FS A-A-3002 - Mirrors, Glass.

1.03 DESIGN REQUIREMENTS

A. Design grab bars and attachments to resist minimum 250 lb concentrated load applied at any point in any direction and forces as required by applicable code.

1.04 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, attachment methods.

1.05 COORDINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Coordinate the Work with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 - PRODUCTS

2.01 TOILET AND BATH ACCESSORIES

A. Manufacturers:
1. A&J Washroom Accessories, Inc
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. Georgia Pacific Professional
6. Purell
7. Tork
8. Substitutions: Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
1. Grind welded joints smooth.
2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Furnish two keys for each accessory to Owner.

C. Stainless Steel Sheet: ASTM A666 Type 304.

D. Stainless Steel Tubing: ASTM A269, Type 304 stainless steel.

E. Galvanized Sheet Steel: ASTM A653/A653M, G90 zinc coating.

F. Mirror Glass (Type MR-F): ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality Q1 mirror select; type with copper and silver coating, and organic overcoating.

G. Adhesive: Two component epoxy type, waterproof.

H. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof.

I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 TOILET ROOM ACCESSORIES

A. Toilet Paper Dispenser: Roll-in-reserve type, designed to allow automatic activation of reserve roll when needed, or manual activation by pressing release bar, surface-

mounted, Satin-finish stainless steel with stainless steel dispensing mechanism, tumbler lock
1. Product: 9030 manufactured by American Specialties, Inc
2. Product: B-2888 manufactured by Bobrick
3. Product: 5402 manufactured by Bradley

B. Paper Towel Dispenser: By Owner, contractor installed

C. Waste Receptacle: continuous piano hinges, tumbler locks
1. Waste receptacle liner: Reusable, heavy-duty vinyl
2. Waste receptacle capacity: 18 gallons
3. Product: 334 recessed manufactured by Bradley

D. Soap Dispenser: Liquid soap dispenser, wall-mounted, Owner provided, contractor installed.

E. Mirrors: Stainless steel framed, 6 mm thick float glass mirror.
1. Size: As indicated on Drawings.
2. Frame: 0.05 inch channel shapes, with mitered and welded and ground corners, and tamperproof hanging system; bright polished finish.
3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and non-absorptive filler material.
4. Product: 0620-2436 manufactured by American Specialties, Inc.
5. Product: B-165 2436 manufactured by Bobrick.
6. Product: 781-2436 manufactured by Bradley.

F. Grab Bars: Stainless steel, 18 Gauge 1-1/4 inches outside diameter, minimum 18 gauge wall Thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
1. Length and configuration: As indicated on Drawings.

G. Rectangular Fold-up Changing Seat: Seat is white colored, black core phenolic. Frame, mounting bracket and retainer hook are type 304 satin finished stainless steel. Seat is 22-1/2″ deep and 48″ wide, projecting 24″ from the wall when in the open position. When retracted, legs fold up to provide low profile against wall.
1. Product: 8209 manufactured by American Specialties, Inc

H. Diaper Changing Station: Wall-mounted, Stainless Steel, non-porous polyethylene, pneumatic cylinder operated door for slow opening and closing, continuous foam core, stainless steel hinge and replaceable snap-lock protective holding straps.
1. Product: 962-11 manufactured by Bradley
2. Product: KB310-SSWM manufactured by Bobrick
3. Product: 9013-9 manufactured by American Specialties, Inc

2.04 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
1. Drying rod: Stainless steel, 1/4 inch diameter.
2. Hooks: 3, 0.06 inch stainless steel rag hooks at shelf front.
3. Mop/broom holders: spring-loaded rubber cam holders at shelf front.

4. Length: As indicated on Drawings.
5. Product: 1315 series manufactured by American Specialties, Inc.
6. Product: B-223 series manufactured by Bobrick.
7. Product: 998 series manufactured by Bradley.

2.05 FACTORY FINISHING

A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, Type SC 2, satin finish , unless otherwise noted.

C. Baked Enamel: Pre-treat to clean condition, apply one coat primer and minimum two coats electrostatic baked enamel.

D. Galvanizing ASTM A123/A123M; hot dip galvanize after fabrication.

E. Galvanizing for Nuts, Bolts and Washers: ASTM A153/A153M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions.

B. Verify exact location of accessories for installation.

C. Verify field measurements are as indicated on product data.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install plumb and level, securely and rigidly anchored to substrate.

B. Mounting Heights and Locations: As indicated on Drawings or required by accessibility regulations.

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Fire extinguisher cabinets and extinguishers
2. Brackets for wall mounting

1.2 REFERENCES

A. National Fire Protection Association:
1. NFPA 10 - Standard for Portable Fire Extinguishers

B. Underwriters Laboratories Inc.:
1. UL - Fire Protection Equipment Directory

1.3 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10 and applicable code.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements and location.

C. Product Data: Submit extinguisher operational features, color and finish, anchorage details.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Execution and Closeout Procedures

B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not install extinguishers when ambient temperature is capable of freezing extinguisher ingredients.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

A. Manufacturers:
   1. JL Industries, Inc
   2. Larsens Manufacturing Company
   3. Nystrom, Inc
   4. Potter Roemer LLC.
   5. Substitutions: Section 01 60 00 - Product Requirements

B. Dry Chemical Type: Cast steel tank, with pressure gage; Class A, B, C; Size 10

C. Extinguisher Finish: Steel, enamel to red color

2.2 FIRE EXTINGUISHER CABINETS

A. Manufacturers:
   1. JL Industries, Inc.
   2. Larsens Manufacturing Company.
   3. Nystrom, Inc.
   4. Potter Roemer LLC.
   5. Substitutions: Section 01 60 00 - Product Requirements

B. Metal: Formed sheet steel, galvanized; 0.036 inch thick base metal

C. Configuration: Semi-recessed type, sized to accommodate accessories

D. Trim Type: Returned to wall surface, with 2 1/2 inch projection

E. Door: 0.016 inch thick, reinforced for flatness and rigidity; lock with break glass access

F. Door Glazing: Glass, clear, 1/8 inch thick tempered

G. Cabinet Mounting Hardware: Appropriate to cabinet

H. Form cabinet enclosure with right angle inside corners and seams
   1. Form perimeter trim and door stiles

I. Pre-drill for anchors

J. Hinge doors for 180 degree opening with continuous piano hinge
   1. Furnish roller type catch

K. Weld, fill, and grind components smooth

L. Glaze doors with resilient channel gasket glazing

M. Finishing Cabinet Exterior Trim and Door: Stainless steel

N. Finishing Cabinet Interior: Stainless steel

2.3 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chromed finish

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Coordination and project conditions

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install cabinets plumb and level in wall openings, maximum 48 inches from finished floor to top of extinguisher handle.

B. Install wall brackets, maximum 48 inches from finished floor to top of extinguisher handle.

C. Secure rigidly in place

D. Place extinguishers in cabinets and on wall brackets

3.3 SCHEDULES

A. Fire Extinguisher location shown on drawings.

END OF SECTION

SECTION 10 51 13

METAL LOCKERS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes metal lockers and accessories

1.2 REFERENCES

A. ASTM International:
1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on locker types, sizes and accessories.

C. Samples: Submit samples of colors.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.1 LOCKERS

A. Manufacturers:
1. Hadrian Manufacturing Inc
2. Lyon Workspace Products, Inc.
3. Penco Products, Inc.
4. Republic Storage Systems Co., Inc.
5. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. Sheet Steel: Mild, cold rolled and leveled unfinished steel; to the following minimum thicknesses:
1. Body and Shelf: 16 gage
2. Door Outer Face: 14 gage
3. Door Inner Face: 14 gage
4. Door Frame: 16 gage
5. Hinges: 16 gage
6. Base: 16 gage
7. Sloping Top: 20 gauge

8. Trim: 16 gage

2.3 ACCESSORIES

A. For Each Locker: Two double prong wall hooks, coat hanger bar, hat shelf, and rubber bumper

2.4 FABRICATION

A. Locker Units:
   1. Width: 18 inches.
   2. Depth: 18 inches.
   3. Height: 36 inches.
   4. Configuration: DOUBLE tier.
   5. Mounting: Surface mounted.
   6. Top: Sloped metal with closures.
   7. Locking: Equipped for padlock hasps.
   8. Ventilation Method: Louvered top and bottom frame and top and bottom of door.

B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.

C. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.

D. Doors: Hollow sandwich construction, 1-3/16 inch thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.

E. Hinges: Two for doors under 42 inches high; three for doors over 42 inches high; weld securely to locker body and door.

F. Locking device supplied by Owner.

G. Furnish ventilation openings at top and bottom of each locker.

H. Form recess for operating handle and locking device.

I. Finish edges smooth without burrs.

J. Fabricate sloped metal tops, ends and closure pieces.

K. Furnish end panels and filler strips.

L. No legs or base on lockers

2.5 FACTORY FINISHING

A. Clean, degrease, and neutralize metal; prime and finish with two coats of enamel.

B. Paint locker units of 1 color throughout.

C. Color: color as selected from manufacturer's standard range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution.

B. Verify prepared bases are in correct position and configuration.

C. Verify bases and embedded anchors are properly sized.

3.2 INSTALLATION

A. Install lockers plumb and square.

B. Place and secure on prepared base.

C. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.

D. Bolt adjoining locker units together to provide rigid installation.

E. Install end panels, filler panels, sloped tops, and bases.

F. Install accessories.

G. Replace components not operating smoothly.

3.3 CLEANING

A. Section 01 77 00 - Closeout Procedures: Final cleaning.

B. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 10 82 13

ROOF SCREENS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Stand-alone roof equipment screens and supporting steel framework. Screens shall be designed to attach to the roof structure and not the equipment being screened.

B. Roof screen accessories.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in concrete.

B. Section 05 12 00 - Structural Steel Framing.

C. Section 05 31 13 - Steel Roof Decking

D. Section 05 50 00 - Metal Fabrications

E. Section 07 71 00 - Roof Specialties

F. Section 09 90 00 - Painting and Coating

G. Division 23 - HVAC Equipment.

1.3 REFERENCES

A. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

B. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

D. ASTM A 1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

E. ASTM A 1057 - Standard Specification for Steel, Structural Tubing, Cold Formed, Welded, Carbon, Zinc-Coated (Galvanized) by the Hot-Dip Process.

F. ASTM B 749 - Standard Specification for Lead and. Lead Alloy Strip, Sheet, and Plate Products.

G. ASTM D 4811 - Standard Specification for Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing.

H. ASTM D 6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.

I. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

K. AWS D1.1 - Structural Welding Code - Steel.

L. AWS D1.6 - Structural Welding Code - Stainless Steel.

1.4 COORDINATION

A. Coordinate Work with other operations and installation of roofing materials to avoid damage to installed insulation and membrane materials.

1.5 ACTION SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Layout and erection drawings showing typical cross sections and dimensioned locations of all frames and base supports. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, shape, and patterns.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

B. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

C. Warranties: 1 Year Manufacturers Warranty

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with a minimum five years documented experience in producing pre-manufactured metal-framed equipment screens.

B. Design Qualifications: Provide structural design calculations stamped by a professional engineer licensed in the state in which this project is located.

C. Welders: AWS certified within previous 12 months.

D. Pre-Installation Meeting:
1. Convene at the jobsite, at least seven calendar days prior to scheduled beginning of construction activities of this section, to review requirements of this section.
2. Require attendance by representatives of the installing subcontractor (who will represent the system manufacturer), the mechanical subcontractors and other entities affected by construction activities of this section.
3. Notify Architect four calendar days in advance of scheduled meeting date.

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Locate in area designated by Architect.
2. Construct mock-up, one full screen section wide, including two roof supports.
3. Do not proceed with remaining work until workmanship, color, and location is approved by Architect.
4. Remove mock-up if required by Architect.
5. Accepted mock-up may remain in place.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the project site clearly marked for proper identification.

B. Receive, handle and store materials in conformance with the manufacturers printed instructions.

C. Store products under cover, in manufacturer's unopened packaging until ready for installation.

D. Protect materials from exposure to moisture.

E. Store materials in a dry, warm, ventilated weathertight location.

F. Protect metal fabrications from damage by exposure to weather.

G. Handling: Use a forklift or crane to move material. Do not lift the bundles by the metal bands.
1. Fork Lift: Spread the forks as far as possible to balance the load. Drive slowly when moving long bundles over uneven surfaces to avoid tipping the load
2. Crane: Position the canvas sling straps so that the space between the straps is at least 1/3 the length of the bundle. Use sling straps with looped ends running one end of the strap through the loop at the other end to cinch the bundle when lifted. When setting the load on the roof, put wood blocks under it to protect the roof and allow space to remove the sling straps.
3. Roof Placement: Spread the bundles and crates out as much as possible to avoid overloading the roof structure. Place the material directly over major supports such as beams or trusses.
4. Position bundles of tubing parallel to the slope of the roof and block prior to opening to prevent the tubing from rolling down the roof slope when unbundled.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits

recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Field Measurements: Verify roof screen dimensions and conditions of the installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating equipment enclosure without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.10 WARRANTY

A. Framing System: Provide manufacturer's standard written limited warranty stating that the complete framing system shall be warranted against structural failure due to cracking, buckling, bending, tearing or corrosion arising under normal use and environmental conditions for the coverage period applicable.

   1. Products installed on projects located 2 miles or greater from salt or brackish bodies of water shall be warranted for twenty (20) years

B. Panel Finish:
   1. Provide written warranty stating that the paint finish applied on all equipment enclosure panels will be warranted against chipping, peeling, cracking, fading, or blistering for the coverage period of twenty (20) years.
   2. Provide warranty signed by the panel manufacturer and paint finish applicator (if separate from manufacturer).

C. The above warranties are in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Design Loads: Comply with Building Code for site location and building height.
   1. Design to resist ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
   2. Design all materials, assembly and attachments to resist snow, wind, suction and uplift loading at any point without damage or permanent set.

B. Structural Design: Prepare structural design calculations for screen framing and attachment to structure including reactions at base supports for verification of roof structure by Architect.

C. All welds to be performed by an AWS certified welder. Valid certification to be provided.

2.2 MANUFACTURERS

A. Acceptable Manufacturer:

   1. RoofScreen Mfg.

2. CityScapes Architectural Innovations

3. Cascade Rooftop Screens, Inc

4. North American Enclosures, Inc

B. Substitutions Procedures: Section - 01 60 00 Product Requirements.

2.3 MATERIALS

A. Square Base Supports: Weldments fabricated from cold rolled steel conforming to ASTM A 1008, fabricated with pre-punched holes in base plate for fastening to roof structure. After fabrication, apply minimum 2 to 4 mil baked on powder coat primer.
1. Height 12 inches

B. Square Base Support Extensions: Fabricated from same material and finish as base supports.
1. Height 3 inches

C. Square Base Cap: Weldments fabricated from AISI Type 304 stainless steel with mill finish, and fabricated to overlap base support and flashing boot a minimum of 2 inches (51 mm). Provide moment resisting adjustable connection to attach framing to base cap.

D. Round Post Supports: 12 inch (305 mm) tall weldments fabricated from galvanized steel tube conforming to ASTM A 500 and cold rolled steel plate conforming to ASTM A36, fabricated with pre-punched holes in base plate for fastening to roof structure. After fabrication, apply minimum 2 to 4 mil shop primer to base plate and weld. Provide height adjustment with galvanized tube sleeve conforming to ASTM A 500, sized to telescope over outside of round post tube and fastened at desired height with self-drilling, self-tapping screws.

E. Round Post Cap: Weldments fabricated from AISI Type 304 stainless steel with mill finish fabricated to slip over 2-1/2" sleeve tube allowing adjustable height when used with Round Post Support.

F. Square TPO Roof Flashing: Fabricated from 60 mil, white, single ply TPO sheet conforming to ASTM D 6878. Provide with base flange that extends a minimum of 5 inches onto the roof surface on all four sides. Riser shall be tapered to allow easy fit over Square Base Supports with minimal gap at top of flashing. Hot weld all seams for water tightness.

G. Square PVC Roof Flashing: Fabricated from 80 mil, white, single ply PVC sheet conforming to ASTM D 4434. Provide with base flange that extends a minimum of 5 inches onto the roof surface on all four sides. Riser shall be tapered to allow easy fit over Square Base Supports with minimal gap at top of flashing. Hot weld all seams for water tightness.

H. Round TPO Roof Flashing: Fabricated from 80 mil, white, single ply TPO sheet conforming to ASTM D 6878. Provide with base flange that extends a minimum of 5 inches onto the roof surface on all four sides. Hot weld all seams for water tightness.

I. Roof Flashing: Refer to Division 07 section that specifies the roof membrane.

J. Base Cap Gasket: EPDM with self-adhesive closed cell foam.

K. Framing: Carbon steel structural tubing in manufacturer's standard sizes, conforming to ASTM A 500 with manufacturer's standard galvanized coating conforming to ASTM A 1057. Provide with wall thickness as determined by structural calculations.

L. Connector Fittings: Fabricated from AISI Type 304 stainless steel with mill finish.

M. Steel Z section: Steel sheet conforming to ASTM A 653, Class SS, with a G90 hot-dip galvanized coating.

N. Steel Hat Channel: Steel sheet conforming to ASTM A 653, Class SS, with a G90 hot-dip galvanized coating.

O. Hardware: Bolts, nuts and washers: 18-8 stainless steel.

P. Self-Drilling Screws: Carbon steel with factory applied protective coating conforming to ASTM B 117 salt spray testing.

Q. Welding Materials: AWS D1.1; type required for materials being welded.

R. Panel:
1. Profile:
   a. 7.2 Rib Panel.
2. Base Metal:
   a. Minimum 24 gauge Galvalume steel sheet, AZ50, conforming to ASTM A 792 for painted and unpainted panels.
3. Finish:
   a. PVDF fluoropolymer, 1 mil, 2 coat, 70 percent.
   b. Siliconized polyester thermoset coating, 0.90 mil minimum dry film thickness.
   c. Color as selected by Architect from manufacturer's standard color range, 20 colors minimum.
   d. Coat reverse side with off-white primer coat.
4. Panel Fasteners: No. 14 self-tapping sheet metal screw. Color coat heads to match panel color.
5. Panel Trim: Same material and finish as panel. Configuration as shown on Drawings

2.4 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

E. Fabricate system components so that portions of screen can be dismantled for repairs to

equipment being screened and for future roof replacement.

F. Trim and Closures: Fabricated from 24 gauge metal and finished with the manufacturer's standard coating system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine area where work will be installed to verify the installation can be performed in accordance with the Drawings and structural calculation requirements without interference from other equipment or trades.

B. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Do not begin installation until conditions have been properly prepared.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide for erection loads, and for sufficient temporary bracing to maintain indicated alignment until completion of erection and installation of permanent attachments.

D. Anchor fabrications to structure as indicated.

E. Separate dissimilar metals and use gasketed fasteners, isolation shim, or isolation tape to eliminate possibility of corrosive or electrolytic action between metals.

F. Exercise care when installing components so as not to damage finish surfaces. Touch up as required to repair damaged finishes.

G. Install flashing boots at base supports as required to provide a watertight connection. Install as recommended by the roof membrane manufacturer.

H. Remove all protective masking from material immediately after installation.

3.4 CLEANING AND PROTECTION

A. Remove all protective masking from framing and trim material immediately after installation. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. Maintain in a clean condition during construction.

B. Protect installed products until completion of project.
   1. Ensure that finishes and structure of installed systems are not damaged by subsequent construction activities.
   2. If minor damage to finishes occurs, repair damage in accordance with manufacturer's recommendations; provide replacement components if repaired finishes are unacceptable to Architect.

C. Prior to Substantial Completion: Remove dust or other foreign matter from component surfaces; clean finishes in accordance with manufacturer's instructions.

D. Replace metal wall panels and framing members that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF DIVISION

DIVISION 11 EQUIPMENT

SECTION 11 51 31

MANUALLY OPERATED PROJECTION SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Roll-up, manually operated projection screens.

B. Related sections:
1. Section 05 50 00 - Metal Fabrications: Metal chains and other support components for suspending projection screens.
2. Section 06 10 53 – Miscellaneous Rough Carpentry: Wood blocking for installation of projection screens.
3. Section 09 21 16 - Gypsum Board Assemblies: Suspended gypsum board ceilings to contain recessed projection screens.
4. Section 09 51 13 – Acoustical Panel Ceilings: Suspended acoustical panel ceilings to adjoin recessed projection screens.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 00 - Submittal Procedures:
1. List of proposed products and product data.
2. Shop drawings showing dimensions, method of attachment, structural support.
3. Samples of finishes for selection by Architect.
4. Manufacturer's installation and maintenance instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver projection screens until the building is enclosed, other construction within spaces where screens will be installed is substantially complete, and installation of screens is ready to begin.

B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.

PARTS 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Draper, Inc., 411 South Pearl Street, Spiceland, Indiana 47385-0425; 765-987-7999.

B. Substitutions: Section 01 60 00 - Product Requirements.

2.2 MANUALLY OPERATED SCREENS

A. Method of installation: Wall mounted.
1. Type: Manually operated, spring roller projection screen for wall installation consisting of case, screen, mounting accessories, and other components necessary for complete installation.

2. Screen case: Extruded mill finish aluminum U shaped case and steel end caps with light grey paint finish. Closure panel to be extruded aluminum T with white finish fitting against bottom cover when screen is retracted. Provide slots in closure for pull down handle.
3. Roller: 1-3/4 inches diameter steel with heavy duty spring and steel end caps.
4. Viewing surface securely attached to steel roller at top and at bottom to aluminum closure.
5. Provide 48 inches long clear anodized aluminum pulldown handle with zinc plated steel hook.

2.3 VIEWING SURFACE

A. Material: Matt white vinyl surface laminated on woven fiberglass base and surface is washable, flame resistant, and mildew resistant; Fiberglass Matt White Surface

B. Size of viewing surface:
1. Wall Mounted: 84 inches high 84 inches wide.

C. Joints: Viewing surface shall contain no seams.

D. Edge treatment: 2 inch wide black masking border

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of projection screens with ceilings construction and related components penetrating or above ceilings such as lighting fixtures, mechanical equipment, ductwork, and fire-suppression system.

B. Coordinate requirements for blocking, structural supports, and construction of recesses to ensure adequate means for installation of screens.

C. Coordinate installation of recessed mounted screens with construction of suspended acoustical panel ceilings specified in Section 09 51 13 Acoustical Panel Ceilings

3.2 INSTALLATION

A. Install projection screens at locations and heights indicated on Drawings.

B. Comply with screen manufacturer's written instructions.

C. Install screens securely to supporting substrate so that screens are level and back of case is plumb.

D. Provide required brackets, hanger rods, and fasteners.

3.3 TESTING AND PROTECTING

A. After installation, operate each screen. Ensure that screen is level and viewing surface plumb when extended. Correct deficiencies.

B. Protect projection screens after installation from damage from construction operations. If damage occurs, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

END OF DIVISION

DIVISION 12 FURNISHINGS

SECTION 12 49 20

ROLLER SHADES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:
1. Manual Roller Shades

B. Related Sections:
1. Section 05 40 00 – Cold-Formed Metal Framing
2. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts
3. Section 09 21 16 – Gypsum Board Assemblies
4. Section 09 51 13 – Acoustical Panel Ceilings
5. Division 26 - Electrical

1.02 REFERENCES

A. Flame-resistant materials shall pass or exceed one or more of the following tests:
1. National Fire Protection Association (NFPA) 701 (small scale for horizontal applications)
2. Department of Transportation Motor Vehicle Safety Standard 302 Flammability of Interior Materials

1.03 SUBMITTALS

B. PRODUCT DATA: Manufacturer's descriptive literature shall be submitted indicating materials, finishes, construction and installation instructions and verifying that product meets requirements specified. Manufacturers' recommendations for maintenance and cleaning shall be included.

C. DRAWINGS AND DIAGRAMS: Wiring diagrams of any motorized components or units, working and assembly drawings shall be supplied as requested.

D. SAMPLE: Responsible contracting officer or agent shall supply one sample shade of each type specified in this contract for approval. Supplied units shall be furnished complete with all required components, mounting and associated hardware, instructions and warranty.

1.04 QUALITY ASSURANCE:

A. Supplier: Manufacturer, subsidiary or licensed agent shall be approved to supply the products specified, and to honor any claims against product presented in accordance with warranty.

B. INSTALLER: Installer or agent shall be qualified to install specified products by prior experience, demonstrated performance and acceptance of requirements of manufacturer, subsidiary, or licensed agent. Installer shall be responsible for an acceptable installation.

C. UNIFORMITY: Provide Manual Roller Shades of only one manufacturer for entire project.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Product shall be delivered to site in manufacturer's original packaging.

B. Product shall be handled and stored to prevent damage to materials, finishes and operating mechanisms.

1.06 JOB CONDITIONS:

A. Prior to shade installation, building shall be enclosed.

B. Interior temperature shall be maintained between 60° F. And 90° F. During and after installation; relative humidity shall not exceed 80%. Wet work shall be complete and dry.

1.07 WARRANTY:

A. Lifetime Limited Warranty. Fabrics warranted for 5 years. Specific product warranties available from manufacturer or its authorized agent.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. Hunter Douglas Architectural

B. Substitutions: Section 01 60 00 – Product Requirements.

2.02 MANUAL ROLLER SHADES

A. Product: Hunter Douglas Architectural, RB 500+, both manual and motorized, as indicated on Drawings.

B. Materials:
1. FABRICS: Inherently anti-static, flame retardant, fade and stain resistant, light filtering, room darkening fabrics. Finish selected by Architect, as specified on Drawings.
2. CONTROL SYSTEM (MANUAL): Adjustment-free continuous qualified #10 stainless steel ball chain ((90-lb. test)) and pulley clutch operating system. Clutch to develop no more than ½ pound drag for ease of lifting. Glass reinforced polyester thermopolymer (PBT) plastic components.
3. CONTROL SYSTEM (MOTORIZED): Decoflex Fry Contact Keypad. Integrate with room lighting controls.
4. MOTOR: Standard motor with centralized intelligences.

5. ROLLER: Circular-shaped painted extruded aluminum tubes. 3” outside diameter extruded tube to have a .090 wall thickness. 2” outside diameter extruded tube to have a .072” wall thickness.
6. END PLUG: Heat stabilized fiber reinforced plastic outside sleeve and center shaft.
7. BOTTOM ROD: Extruded aluminum weight in a Sealed Pocket Hem Bar, or Flat Bottom Bar for fabrics that are not seamable. Bottom rod is for tracking adjustments and provides uniform look.
8. MOUNTING HARDWARE: Manufacturer’s standard .07” nickel-plated, C1008/1010 cold rolled steel universal brackets including end plug bracket with lock down retainer device.
9. FASCIA: Aluminum.

2.03 FABRICATION

A. Shade measurements shall be accurate to within ± 1/8” or as recommended in writing by manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION:

A. SUBCONTRACTOR shall be responsible for inspection on site, approval of mounting surfaces, installation conditions and field measurement for this work.

B. OTHER INTERACTING TRADES shall receive drawings of shade systems, dimensions, assembly and installation methods from subcontractor upon request.

3.02 INSTALLATION:

A. INSTALLATION shall comply with manufacturer’s specifications, standards and procedures as detailed on contract drawings.

B. ADEQUATE CLEARANCE shall be provided to permit unencumbered operation of shade and hardware.

C. CLEAN finish installation of dirt and finger marks. Leave work area clean and free of debris.

3.03 DEMONSTRATION:

A. Demonstrate operation method and instruct owner’s personnel in the proper operation and maintenance of the blinds.

END OF DIVISION

DIVISION 13 SPECIAL CONSTRUCTION

SECTION 13 34 19

METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes pre-engineered, shop fabricated structural steel building frame; metal wall and single sloped roof system including trimmed openings, forming weather tight, durable, and easily erected metal building system.

B. Related Sections:
1. Section 03 10 00 - Concrete Forming and Accessories: Execution requirements for placement of anchor bolts specified in this section in concrete.
2. Section 07 90 00 - Joint Protection.
3. Section 09 90 00 - Painting and Coating

1.2 REFERENCES

A. American Institute of Steel Construction:
1. AISC S335 - Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
2. AISC S342L - Load and Resistance Factor Design Specification for Structural Steel Buildings.

B. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
6. ASTM A490 - Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
7. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
8. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
9. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
10. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
11. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

13. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

C. American Welding Society:
   1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
   2. AWS D1.1 - Structural Welding Code - Steel.

D. Metal Building Manufacturers Association:
   1. MBMA - Low Rise Building Systems Manual.

E. SSPC: The Society for Protective Coatings:
   1. SSPC - Steel Structures Painting Manual.
   2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

F. Underwriters Laboratories Inc.:
   1. UL - Building Materials Directory.

1.3 SYSTEM DESCRIPTION

A. Single span rigid frame.

B. Bay Spacing: as indicated on drawings

C. Primary Framing: Rigid frame of rafter beams and columns, expendable end walls (full end wall frames) and wind bracing.

D. Secondary Framing: purlins, girts, eave struts, flange bracing, clips, and other items detailed.

E. Wall System: Preformed metal panels of vertical and horizontal profile as indicated on drawings, with sub-girt framing/anchorage assembly, and accessory components.

F. Roof System : Preformed metal panels of upslope profile, with sub-girt framing/anchorage assembly, and accessory components.

G. Roof Slope: As indicated on Drawings.

1.4 DESIGN REQUIREMENTS

A. Design members to withstand dead load, applicable snow load, vertical and horizontal seismic loads, and design loads due to pressure and suction of wind calculated in accordance with applicable code.

B. Design members to support mechanical and electrical equipment.

C. Maximum allowable deflection: 1/180 of span with imposed loads for exterior wall and roof system.

D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

E. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 180 degrees F.

F. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

1.5 PERFORMANCE REQUIREMENTS

A. Conform to applicable code for submission of design calculations, reviewed shop and erection drawings, and as required for acquiring permits.

B. Cooperate with regulatory agency or authority and provide data as requested authority having jurisdiction.

C. Provide components of each type from one manufacturer compatible with adjacent materials.

1.6 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, loads,; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, method or installation; framing anchor bolt settings, sizes, and locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

C. Product Data: Submit data on profiles, component dimensions, fasteners and performance characteristics.

D. Samples: Submit two samples of pre-coated metal panels for each color selected, 12” by full panel width in size illustrating color and texture of finish.

E. Manufacturer's Instructions: Submit preparation requirements, anchor bolt placement, and size.

F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

1.7 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Closeout Procedures: Closeout submittals.

B. Project Record Documents: Record actual locations of concealed components and utilities.

1.8 QUALITY ASSURANCE

A. Perform Work in accordance with AISC S335, AISC S342L, and MBMA Low Rise Building Systems Manual.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience and a member of the Metal Building Manufacturers Association.

B. Erector: Company specializing in performing Work of this section with minimum five years documented experience and approved by manufacturer.

C. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Idaho.

1.10 WARRANTY

A. Section 01 77 00 – Closeout Procedures: Warranties.

B. Furnish five year manufacturer warranty for pre-engineered building systems and components.

C. Furnish twenty year warranty to include coverage for exterior pre-finished surfaces color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.

PART 2 PRODUCTS

2.1 PRE-ENGINEERED BUILDINGS

A. Manufacturers:
1. Butler Manufacturing Co.
2. Behlen Building Systems
3. Nucor Building Systems.
4. Varco-Pruden Buildings.
5. R&M Steel Company
6. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS - FRAMING

A. Structural Steel Members: ASTM A36/A36M, A529/A529M Grade 50 and A572/A572M, Grade 50.

B. Structural Tubing: ASTM A500/A500M, Grade B or A501.

C. Plate or Bar Stock: ASTM A529/A529M Grade 50.

D. Anchor Bolts: ASTM A307 Grade A, galvanized.

E. Bolts, Nuts, and Washers: ASTM A325 and ASTM A490.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Primer: SSPC Paint 20, Grey.

H. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.3 COMPONENTS - WALL AND ROOF SYSTEM

A. Sheet Steel: ASTM A653/A653M; G90 zinc coating.

B. Insulation per Section 07 21 13.

C. Joint Seal Gaskets: Manufacturer's standard type.

D. Fasteners: Manufacturer's standard type, galvanized or high performance organic coating, finish to match adjacent surfaces when exterior exposed.

E. Sealant: Manufacturer's standard type, non-staining, elastomeric, skinning.

F. Trim, Closure Pieces, Caps, Flashings, Facias and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

G. Bituminous Paint: Asphaltic type.

H. Roof Curbs: Welded units fabricated for Metal Roof application. Minimum 18 gauge Galvalume™ coated steel, with welds cleaned and treated with protective coating compatible with the Galvalume™ substrate. Minimum curb height shall be 8".
   1. Top of curb to be level with ground, with 1 ½" top flange.
   2. Curb walls insulated with 1 ½"-3lb.density fiberglass insulation.
   3. Welded integral cricket on upslope side of curb to divert water.
   4. Metal or plastic rib covers supplied loose for flexibility when installing curb.
   5. Standard sub-frame shall be minimum 16 gauge steel.All fasteners and sealants required for installation shall be furnished by Roof Curb manufacturer

I. Gutters and Downspouts
   1. Product Description:
      a. Gutters: Sheet metal; seamless, Rectangular style profile.
      b. Downspouts: Sheet metal; seamless Rectangular profile.
      c. Splash Pads: Precast concrete type, size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
   2. Anchors and Supports: Profiled to suit gutters and downspouts.
      a. Anchoring Devices: In accordance with CDA or SMACNA requirements.
      b. Gutter Supports: Brackets or Straps.
      c. Downspout Supports: Brackets or Straps.

2.4 COMPONENTS - METAL DOORS AND FRAMES

A. Doors: Specified in Section 08 13 14.

B. Frames: Specified in Section 08 12 14.

2.5 COMPONENTS – OVERHEAD COILING DOORS

A. Overhead Coiling Doors: Specified in Section 08 33 23

B. Overhead Door Frame: Formed steel sections braced to building frame by building manufacturer

2.6 COMPONENTS - WINDOWS

A. Windows: Specified in Section 08 41 13.

2.7 FABRICATION - FRAMING

A. Fabricate members in accordance with AISC Specification for plate, bar, tube, or rolled structural shapes.

B. Anchor Bolts: Formed with straight shank, bottom nut and washer assembled with template for casting into concrete.

C. Girts/Purlins: Rolled formed structural shape to receive siding, roofing sheet.

D. Provide framing for door, window, louver, ventilator, and other openings

2.8 FABRICATION - WALL AND ROOF SYSTEMS

A. Metal Wall Panels (MP-1): Minimum 24 gauge metal thickness
   1. Profile:Reverse R Panel profile
   2. Coverage Width: 36 inches
   3. 36″ width coverage with inverted major ribs on 12″ centers
   4. Semi-concealed fasteners
   5. Panel Length: Full height of the wall without horizontal joints

B. Roofing: Minimum 24 gauge metal thickness, architectural profile, lapped male/female edges fitted with continuous gaskets, galvalume.

C. Liner: Minimum 26 gauge metal thickness, male/female edges

D. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed shop cut and factory mitered to required angles. Back brace mitered internal corners.

E. Flashings, Closure Pieces, Fascia, Infills and Caps: Same material and finish as adjacent material, profile to suit system.

F. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type finish.

G. Roof Line Trim: Basic Sculptured Trim Type: Low-Eave Gutter (on slope or horizontal) / Sculptured Rake Trim

2.9 FACTORY FINISHING

A. Framing Members: Clean, prepare, and prime to SSPC Manual requirements.

B. Galvanizing for Nuts, Bolts and Washers: ASTM A153/A153M.

C. Interior Surfaces of Wall Roof Components and Accessories: Precoated enamel on steel finish, color as selected from manufacturer's standard range.

D. Exterior Surfaces of Wall and Roof Components and Accessories: Precoated enamel on steel of Kynar 500 or Hylar 5000 finish, color as selected from manufacturer's standard range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 – Execution.

B. Verify foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position.

3.2 ERECTION - FRAMING

A. Erect framing in accordance with AISC Specification.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval of Architect/Engineer.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.3 ERECTION - WALL AND ROOFING SYSTEMS

A. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

B. Fasten cladding system to structural supports, aligned level and plumb.

C. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.

D. Use exposed fasteners.

E. Install insulation and vapor retarder utilizing manufacturer standard method for attachment.

F. Install sealant and gaskets to prevent weather penetration.

3.4 ERECTION - ACCESSORIES

A. Seal wall and roof accessories watertight and weather tight with sealant.

3.5 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

C. Siding and Roofing: 1/8 inch from indicated position.

END OF DIVISION

Geotechnical Engineering Evaluation

GeoProfessional Innovation®

June 7, 2023
File: MO23091A

Ms. Margie Kennedy
Idaho Division of Public Works
502 N. 4th St.
Boise, ID 83720

RE: **Geotechnical Engineering Evaluation**
DPW 22-091 CSI Diesel Mechanics Facility
North College Road
Twin Falls, Idaho

Good Day, Margie:

GeoProfessional Innovation Corporation (GPI) performed the geotechnical engineering evaluation for the proposed College of Southern Idaho Diesel Mechanics Facility to be located along North College Road in Twin Falls, Idaho. Our services were performed referencing our proposal dated March 31, 2023. We previously provided a draft report dated May 9, 2023. After review, no necessary edits or changes were identified by the project team. Therefore, we've prepared this final report that supersedes our draft report and remains essentially unchanged. Nonetheless, please review the deliverable thoroughly; understanding and implementing it in its entirety.

Herein we provide specific geotechnical recommendations for earthwork activities, subgrade preparations, shallow foundation design, slab-on-grade floors, pavements, and stormwater disposal. These recommendations are based on the conditions encountered during exploration and observed at the site. Read and implement the geotechnical recommendations presented herein in their entirety; portions or individual sections of our report cannot be relied upon without the supporting text in other pertinent sections. Our opinion is that project construction success will depend, in part, on designers and contractors implementing our report recommendations, adhering to good construction practices, and providing the necessary construction monitoring, testing, and geotechnical consultation to document the work has been accomplished as recommended herein.

We appreciate the opportunity to maintain our professional relationship with the Idaho Division of Public Works on this project. Please do not hesitate to contact us if you have any questions or comments.

Sincerely,
GPI

PROFESSIONAL ENGINEER LICENSED 20594 STATE OF IDAHO JUSTIN B. MAFFEY
06/07/2023

Justin B. Maffey, P.E.
Project Engineer

Travis J. Wambeke, P.E.
Principal Engineer

TJW/mg

Geotechnical Engineering Evaluation

DPW 22-091 CSI Diesel Mechanics Facility
North College Road
Twin Falls, Idaho

PREPARED FOR:
Ms. Margie Kennedy
Idaho Division of Public Works
502 N. 4th St.
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PREPARED BY:
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Boise, ID 83709
(509) 339-2000
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June 7, 2023

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North College Road
Twin Falls, Idaho

INTRODUCTION

Our investigation's purpose was to assess subsurface conditions at the site and prepare this report outlining geotechnical recommendations to assist the Idaho Division of Public Works (DPW), Keller Associates, Inc. (Keller), and Integrus Architecture (Integrus) with design and construction of the proposed CSI Diesel Mechanics Facility to be located along North College Road on the College of Southern Idaho (CSI) school campus in Twin Falls, Idaho. The project area is shown on Plate 1, *Exploration Map*. The following text outlines our services, project understanding, exploration findings, and geotechnical opinions and recommendations.

SCOPE OF SERVICE

1. Coordinated exploration with DPW, CSI, and the Idaho Digline prior to exploration.

2. Explored the subsurface soil conditions via 10 exploratory test pits at various accessible locations. Our approximate exploration locations are shown on Plate 1.

3. Performed 1 field infiltration test to evaluate the near surface soil infiltration characteristics.

4. Accomplished laboratory testing to estimate soil engineering parameters referencing *ASTM International* (ASTM) and *Standard Methods for the Examination of Water and Wastewater* (SM) procedures.

5. Performed geotechnical engineering analysis to develop design and construction recommendations commensurate with the planned improvements.

6. Prepared and provided this draft report summarizing our findings, opinions and geotechnical recommendations including exploration logs and laboratory test results. Once we receive the project team's comments, we will discuss and incorporate requested clarifications or needs for additional information.

PROJECT UNDERSTANDING

Existing Site Conditions

The project site is located along North College Road on the northwest side of the CSI campus, just east of the Northview Apartment buildings. The site is bordered to the north and east by agricultural fields, to the south by North College Road, and to the west by the Northview Apartment buildings. An existing gravel access road currently separates the site and the surface conditions vary from a combination of agricultural fields, a tree nursery, and landscaped areas. The existing ground surface is relatively flat with less than 3 feet of vertical relief. Utilities exist along the access road, just east of the planned parking areas. Additionally, CSI reports an abandoned powerline exists in the northwest corner of the site, traversing southeast to North College Road.

Proposed Construction

From discussions with you and reviewing the preliminary site plan, the development includes constructing a diesel mechanic shop building with associated classroom and office space for CSI students and staff. The structure comprises a single-story, pre-engineered metal building that will bear on conventional shallow foundations and slab-on-grade floors. Structural loads include column loads up to 50 kips and 1.5 kips per linear foot along continuous footings. Relatively high loads may be applied to the slab from storage and vehicle maintenance equipment at the shop. No below-grade spaces are planned.

Exterior concrete hardscapes and gravel surfaced areas are also planned in isolated locations around the building to serve as outdoor work areas. The site will be accessed from North College Road to the south via the existing access road that will be improved to comprise asphalt pavement as part of the development. Asphalt parking areas are also planned along the west side of the building and to the west of the access road for a total of about 130 stalls. We expect the majority of traffic will comprise typical passenger vehicles, service vehicles, delivery and refuse trucks, and semi-tractor trailers with HL93 loading. Keller reports that traffic will also include occasional low-boy trailers transporting construction equipment with vehicle weights up to 160,000 pounds.

Site grading is relatively minor at less than 3 feet to level the building pad. Stormwater will be collected from new impervious areas and conveyed to an on-site drainage gallery. The drainage gallery is located southwest of the building, and is sized for disposal via infiltration. We expect franchise utilities will extend to the site from North College Road.

FIELD EXPLORATION

GPI accomplished exploration via 10 exploratory test pits within the planned improvement areas outlined to us by DPW and Keller. Test pits were advanced with a Volvo ECR 145E equipped with a 2-foot-wide bucket. Plate 1 illustrates approximate exploration locations. To avoid damage to existing utilities, irrigation, and landscape areas on site, we did not excavate in the southwest portion of the proposed development. GPI's geotechnical engineer observed exploration on April 17, 2023 and visually described, classified, and logged the soil encountered referencing the *Unified Soil Classification System* (USCS). Graphical logs showing the observed soil conditions along with a USCS description are included in Appendix A, *USCS and Exploration Logs*. Exploration locations were loosely backfilled with site soil upon completion and were not landscaped, reseeded, or recompacted.

While on site, we performed 1 infiltration test in test pit TP-23091A-1. Infiltration testing was accomplished at approximately 4 feet below the ground surface referencing the single-ring infiltrometer method. Infiltration test results are discussed in the *Site Drainage* report section.

LABORATORY TESTING

We performed laboratory testing in reference to ASTM and SM standards on select soil samples obtained during exploration. Laboratory testing included:

- In-situ moisture content
- Grain size distribution
- Atterberg limits
- In-place density
- Consolidation
- Modified Proctor
- pH, resistivity, & sulfates

These laboratory test results were used in conjunction with field testing and observations to correlate soil engineering characteristics for design. Laboratory tests are provided in Appendix B, *Laboratory Test Results* and are also included on the individual exploration logs in Appendix A.

SUBSURFACE CONDITIONS

Topsoil containing trace vegetation and organics was encountered at the ground surface in each exploration location extending 0.3 to 1.0 foot below the ground surface (BGS). Topsoil comprised silt that was gray-brown, soft, and moist. Beneath topsoil, silt loess with varying amounts of fine sand was encountered that was

described as tan to brown, medium dense to dense, and dry to moist. The silt profile observed in the locations explored was generally described as silt with fine sand. However, sandy silt lenses exist throughout the profile and the silt content will vary across the site, common in wind-deposited loess soil. Beneath silt loess, we encountered lightly to moderately cemented caliche described as silty fine sand that was reddish-tan to brown, dense to very dense, and moist, extending to termination depths.

Neither groundwater nor bedrock were encountered during exploration. However, well log research in the immediate project vicinity suggests groundwater and basalt bedrock may exist in the upper 20 feet BGS. Groundwater may be encountered in excavations at any time of the year and will be largely influenced by changes in precipitation, irrigation, and infiltration.

GEOTECHNICAL ENGINEERING RECOMMENDATIONS

The following report sections provide our geotechnical engineering recommendations for design and construction of the planned improvements.

Earthwork

Site Stripping

The existing ground surface comprises topsoil with trace to moderate vegetation and organics including tree roots to depths as deep as 5 feet near the mature trees that exist on the south portion of the site. Remove topsoil from the site and stockpile it for use in landscape areas. We recommend at least 1 foot of soil be stripped from the site to remove vegetation and organics. Locate the abandoned powerline trench or existing utility trenches beneath proposed building and hardscape footprints. Remove the utility piping and loose soil along the alignments and replace them with structural fill as outlined herein. Remove large, mature trees and strip the soil surrounding the trees such that roots larger than ½ inch in diameter are removed from beneath the planned improvements. Isolated thicker topsoil zones should be expected around these trees and we recommend budgeting 8 cubic yard sub-excavation contingencies to remove roots and topsoil for each tree with a butt diameter greater than 6 inches. Extend site stripping at least 5 feet laterally beyond the improvement extents.

Any depressions originating from site stripping and root removal should be remediated as follows:

- Completely remove loose and disturbed soil within or adjacent to the depression to undisturbed native soil.
- Prepare the subgrade per *Establishing Subgrades* section below.
- Replace the depression with structural fill according to the *Structural Fill* report section. In pavement areas, apply geotextiles at the subgrade as specified herein.

Excavation Characteristics

Site soil may be excavated using conventional excavation techniques. Carefully plan and implement temporary excavations and slope, shore, or brace them in accordance with the *Occupational Safety and Health Act* (OSHA) regulations and local code. The site soil is classified as type "C" when dry. Therefore, provisions should be made to allow temporary excavations of any type to be sloped back to at least 1.5H:1.0V (horizontal to vertical). However, temporary construction slopes can vary depending on soil type, consistency, or moisture conditions and must be evaluated on a case-by-case basis during construction by the contractor.

Construction vibrations can cause excavations to slough or cave. Do not stockpile material adjacent to or within 10 feet of excavations as it may cause a surcharge and contribute to excavation instability. Ultimately, the

contractor is solely responsible for site safety and excavation configurations factoring in water infiltration, construction access, adjacent loading, and other factors that contribute to excavation stability.

Although groundwater is not expected within the planned excavation limits, water may enter excavations from runoff, seeps, springs, irrigation, or precipitation. Plan excavations with water collection points and utilize conventional sumps and pumps to remove nuisance water. If site soil excavations are not immediately backfilled, they may degrade when exposed to runoff and require over-excavation and replacement with granular fill. Perform construction activities and excavation backfilling as rapidly as possible following excavation to reduce the potential for subgrades to degrade under construction traffic. Further, installing perimeter drainage systems proactively can facilitate drainage during construction and reduce over-excavation. See *Site Drainage* section for additional details.

Establishing Subgrades

Following site stripping and excavation to achieve planned grades, and prior to placing structural fill or concrete, prepare project subgrades by exposing undisturbed native silt with sand or sandy silt with smooth blade equipment. Where native subgrades are disturbed; scarify a minimum of 0.7 feet deep, moisture condition, and compact to 92% of the soil's maximum dry density per ASTM D1557 (Modified Proctor) referencing the *Structural Fill* report section.

Our opinion is careful construction and earthwork procedures are critical to achieving adequate subgrade preparation and reducing over-excavation. Specifically, these procedures could include, but are not limited to, carefully staging equipment and/or stockpiles, routing construction equipment away from subgrades, and implementing aggressive site drainage procedures to help reduce saturating subgrades during wet weather conditions.

Over-Excavations

Soft, loose, wet, pumping, or rutting areas that cannot achieve subgrade or compaction requirements following adequate moisture conditioning must be removed to expose medium dense native soil at the direction of GPI and DPW. Replace over-excavations with *Granular Structural Fill* or *Crushed Aggregate* meeting requirements in the *Structural Fill* report section. Soft, wet soil over-excavation shall be determined during construction by DPW or the geotechnical engineer-of-record retained for construction (GER) and shall extend at least 1 foot below the subgrade and laterally ½ the depth.

Structural Fill

All fill for this project must be placed as structural fill. Site soil (excluding any soil containing vegetation, organics, or debris) may be reused for site grading outside the building footprint provided it is processed to meet the requirements in this report. Various imported fill materials will be required throughout construction. Our recommended material requirements for structural fill are provided referencing the latest *Idaho Standards for Public Works Construction* (ISPWC) and are outlined in Table 1.

Table 1. Structural Fill Specifications and Allowable Use

Soil Fill Product	Allowable Use	Material Specifications
General Structural Fill (SF-1)	• Site grading • Backfilling utility trenches • Foundation stem wall & slab backfill	• Soil classified as GP, GM, GW, GC, SP, SM, SW, or ML according to the USCS. • Soil must contain less than 3 percent (by weight) of organics, vegetation, wood, metal, plastic, or other deleterious substances. • Site soil generally meets these requirements but may require processing to remove vegetation, roots, organics, and debris.
Granular Structural Fill (SF-2)	• Backfilling over-excavations • Construction access points/roads • SF-1 applications	• Meeting requirements in ISPWC *Section 802 – CRUSHED AGGREGATES (Type II)* • Soil may not contain particles larger than 0.5 feet in diameter. Material locally known as "pit run" or "shot rock" is also acceptable.
Crushed Aggregate (CA-1)	• Slab and pavement support aggregate • SF-2 applications	• Meeting requirements in ISPWC *Section 802 – CRUSHED AGGREGATES (Type I)*
Drain Rock (DR-1)	• Perimeter foundation drain construction	• Meeting requirements in ISPWC *Section 801 – UNCRUSHED AGGREGATES (Drain Rock)*
Pipe Bedding (PB-1)	• Utility pipe bedding	• Meeting requirements in ISPWC *Section 305 – PIPE BEDDING*
Unsatisfactory Soil	• NONE	• Soil classified as SC, CL, MH, OH, CH, OL, or PT may not be used at the project site. • Excess moisture does not render a soil unsatisfactory. Contractors must attempt moisture conditioning (i.e. drying or wetting) prior to soil disposal. Alternatively, subcontractors may elect to remove and replace over-optimum soil prior to moisture conditioning at no expense to CSI or DPW. • Any soil containing more than 3 percent (by weight) of organics, vegetation, wood, metal, plastic, or other deleterious substances.

Site Soil Reuse

Existing soil excavated from the site may be reused as SF-1 for site grading, utility trench backfilling, and other structural fill applications provided it meets the requirements in Table 1. Based on our site exploration and laboratory testing, site soil may require moderate drying or wetting prior to effective reuse. Earthwork contractors must understand and plan for the time required to process soil to meet the report requirements.

Difficulty achieving required compaction may impact construction costs, schedules, and other project aspects. Allowing time and space (i.e. lay-down area) to process excavated site soil and facilitate proper moisture conditioning is critical if the contractor plans to reuse site soil as structural fill and when establishing subgrades. Proper moisture conditioning can help reduce excessive compaction efforts and the need to import granular fill.

Compaction

Place structural fill only over approved subgrades. Never place structural fill over frozen, saturated, or soft subgrades, or subgrades not reviewed and approved by the project GER retained for construction. Fill placed outside building, pavement, or hardscape envelopes can be placed as non-structural fill (i.e. landscape fill) providing there are no structures (sidewalk, curbs, utilities, signs, etc.) planned directly above the landscape fill. Structural fill products must be moisture conditioned to near optimum moisture content and placed in maximum 1-foot-thick, loose lifts. This lift thickness requires compaction equipment with energy rating at least 5 tons. If smaller or lighter compaction equipment is used, reduce the lift thickness to meet the compaction requirements presented in Table 2 below.

Table 2. Required Compaction for Designated Project Areas

Project Area	Required Structural Fill Product	Compaction Requirement[1]
All project subgrades	Native soil	92%[2]
Site grading, utility trench backfilling, stem wall backfill	SF-1, SF-2[3], or CA-1	95%
Pavement & slab support aggregate, gravel work areas	CA-1	95%

1. Relative compaction requirement compared to the maximum dry density of the soil as determined by ASTM D1557 (Modified Proctor).
2. Medium dense native silt with sand or sandy silt cut neat with smooth blade equipment need not be compacted.
3. Soil that is too coarse for Proctor density testing shall be compacted to create a dense, interlocking, and unyielding surface, referencing *Coarse Soil Compaction* report section.

Coarse Soil Compaction

Any material with greater than 30 percent retained above the ¾-inch sieve is too coarse for Proctor density testing. Coarse granular structural fill products are often known locally as "pit-run" or "shot-rock". Compact coarse fill using a "method specification" developed during construction, based on the material characteristics and the contractor's means and methods. An example method specification is outlined in ISPWC *Section 202, Part 3.8 C.3*. It is common that method specifications are developed during construction, specific to the materials and conditions encountered. At a minimum, GPI recommends coarse granular fill be placed in maximum 1.5-foot-thick lifts and compacted with 5 complete passes of a 10-ton, vibratory or grid roller. Vibratory rollers must have a dynamic force of at least 30,000 pounds per impact per vibration, and at least 1,000 vibrations per minute. Where adequate compaction equipment cannot access fill areas, do not use coarse fill. Coarse fill must be compacted to a dense, interlocking, and unyielding surface.

Earthwork Seasonality/Wet Weather Considerations

Once the subgrade elevation is achieved, it is the contractor's responsibility to protect the soil from degrading under construction traffic, freezing, and/or wet weather. Initial footing excavations should not be completed within 24 hours of expected precipitation. Footing or slab concrete placement should never be attempted following a significant precipitation event and the subgrade should never be allowed to freeze prior to concrete or fill placement. The condition of the subgrade and careful construction procedures are critical to foundation and slab stability and the long-term performance of the structure.

When construction is attempted before soil can dry after precipitation or during wet periods of the year (November through April), earthwork at the subgrade elevation should be completed by low pressure, track-mounted equipment that spreads and reduces vehicle load. Work should not be performed immediately after rainfall or until soil can dry to below optimum moisture content. Disturbed or saturated soil shall not be allowed below any structure and especially at foundation and slab subgrades. The contractor should begin final subgrade preparations at the furthest point from the excavation access point and work toward the excavation

exit. After preparing subgrades, it is the contractor's sole responsibility to protect subgrades from degradation, freezing, saturation, or other disturbance.

Geosynthetics

Geotextile separation fabric is required for asphalt pavement sections, gravel work areas, and foundation drain construction. Geotextile fabrics can also aid constructability and performance for various construction aspects such as remediating soft areas. Geogrid reinforcement is required for gravel work area construction and can help improve soft subgrades encountered during construction. Where utilized, geosynthetics shall meet the material requirements in ISPWC *Section 2050,* the minimum requirements in ISPWC *Section 2050 Part 2.3 (Type III),* and the minimum properties in Table 3.

Table 3. Geosynthetic Specifications

Geosynthetic Type	Applicable Use	Minimum Material Specifications
Non-Woven Geotextile	• Foundation drains • Pavement sections and gravel work areas for subgrade separation	• Grab tensile strength: 270 pounds (ASTM D4632) • Puncture strength: 100 pounds (ASTM D6241) • Apparent opening size: #70 or finer • Permittivity: 0.7 seconds^{-1} (ASTM D4491)
Triaxial or Biaxial Geogrid	• Gravel work areas • Construction access points/roads • Persistent soft subgrade conditions	• 93 percent junction efficiency (GRI-GG2-05) • 3.0 kg-cm/degree Aperture Stability (U.S. Army Corp of Engineers Ref. 3.3.1.2000) • Minimum Radial Stiffness of 15,400 lb/ft at 0.5% Strain (ASTM D6637), applies only to triaxial geogrid

Where used, apply geosynthetics directly on approved subgrades, taut, free of wrinkles, and overlapped at least 1 foot. Consult GPI to review geosynthetic applications or other subgrade improvement alternatives if desired.

Utility Trench Construction Considerations

Pipe bedding for utility construction should conform to Table 1 of this report. Remove loose soil from the base of utility trenches prior to placing pipe bedding. If water is encountered, remove it from the base of the utility trench before placing pipe bedding. We recommend at least 0.3 feet of bedding placed over undisturbed native soil supported according to the pipe manufacturer's specifications and ISPWC requirements. For City of Twin Falls (City) utility installations, adhere typical City standards.

Thoroughly place and compact bedding below pipe haunches or the zone between the pipe invert and the spring line. Then place pipe bedding and compact it from the pipe invert to 1 foot above the top of the pipe with tamping bars and/or plate compactors to render the backfill to a firm and unyielding condition. To accomplish bedding compaction, the distance between the side of the pipe at the spring line and the trench wall should be at least 1 foot. The remainder of the utility trench should be backfilled in accordance with this report's *Compaction* section.

Earthwork Documentation

Successful earthwork activities are important to the project's long-term performance. Retaining experienced earthwork subcontractors is the first step in having confidence that earthwork will be performed in reference to this report's requirements. Providing the necessary testing and engineering verification of earthwork activities is the second step. We recommend GPI be retained to verify site stripping, subgrade preparations, design-specified subgrade conditions and soil bearing units, and compaction are accomplished per this report's

requirements. If another firm is retained to perform these critical design confirmation activities, they are assuming the role of the geotechnical engineer-of-record for construction (GER). The following outlines the minimum testing and observation frequencies to be implemented during earthwork and foundation construction.

1. Site Stripping. Site stripping confirmed by experienced geotechnical engineer to document conditions as outlined in the *Earthwork* section.

2. Foundation and Slab Subgrades. Bearing surface conditions verified by an experienced geotechnical engineer to confirm conditions as required by design. Where subgrades are disturbed, 1 compaction test every 100 linear feet (lf) for continuous foundations (+1 per column) and every 2,000 sf for slab areas, or a minimum of 4 tests per alignment/area.

3. Pavement, Hardscape, and Gravel Work Area Subgrades. Native soil cut with smooth blade equipment and, where applicable, 1 compaction test every 2,000 sf of prepared subgrade area, minimum 3 tests per testing event.

4. Site Grading/Structural Fill Placement. One compaction test every 2,000 sf, per structural fill lift, minimum 3 tests per testing event.

5. Foundation Stem Wall Backfill. One compaction test every 100 lf of wall or minimum 3 tests per wall line (interior and exterior), whichever results in the greater number of tests, per fill lift.

6. Utility Trench Backfill. One compaction test every 100 lf of trench and minimum 3 tests per utility alignment, whichever results in the greater number of tests, per fill lift.

7. Pavement & Slab Support Aggregate. One compaction test every 2,000 sf, per fill lift, minimum 3 tests per testing event.

8. Asphalt Pavement Construction. One compaction test every 2,000 sf, per lift. One laboratory test suite on a bulk sample of hot mix asphalt per each day's paving, including oil content, gradation and maximum theoretical (Rice) specific gravity.

9. Exterior Concrete Construction. One suite of field tests including slump, temperature, air content, and 1 set of 4 compressive strength cylinders for every 100 cubic yards of concrete placed, per each day's placement.

Foundation Design and Construction

The following text delineates GPI's recommended foundation design criteria, which are based on site soil conditions and the structural loads provided by the project architect and structural designer, Integrus. If foundation loading conditions change or construction plans change from those described herein, please notify GPI so we can make appropriate changes to our design recommendations. Based on the relatively light structural loads, the subsurface conditions encountered, and our experience with similar soil conditions, our opinion is that shallow foundations may be supported directly on native subgrades prepared per the *Establishing Subgrades* report section. Additionally, shallow foundation design must incorporate the following criteria and the current International Building Code (IBC) edition:

Shallow Foundation Design Criteria

1. Allowable bearing pressure: 2,500 pounds per square foot (psf). This requires:
   a. Column loads less than 50 kips & wall loads less than 2 kips per linear foot.
   b. Bearing on approved native subgrades prepared per the *Establishing Subgrades* report section.
   c. Frost protection embedment depth: 2.0 feet below finished exterior surface (Twin Falls County).
   d. Drained conditions via a perimeter foundation drain. See Plate 2, *Foundation Drain Schematic,* and the *Site Drainage* report section for additional details.
   e. Thickened slab footings should be avoided due to their propensity for cracking at the transition between section thicknesses.

2. Static vertical settlement estimates:
   a. Total settlement: 1.0 inch.
   b. Differential settlement: 0.5 inches in 30-foot horizontal span.

3. Lateral load resistance:
   a. Foundation base friction coefficient:
      i. 0.35 for foundations cast on compacted native silt with sand or sandy silt subgrades.
      ii. Reduce friction by ⅔ for precast elements.
   b. Lateral passive resistance is available on foundation sides at 340 pounds per cubic foot (pcf) equivalent fluid weight (EFW) assuming compacted SF-1 backfill. This requires:
      i. ¾ inches of lateral movement to mobilize full passive pressure.
      ii. Drained conditions within stem wall backfill via a perimeter foundation drain.

4. Soil corrosivity:
   a. Laboratory test results indicate native soil exhibits a moderately corrosive environment (pH = 8.2, Resistivity = 4,170 ohm-cm, Sulfates = 7.2 ppm).
   b. Structural design shall account for moderate corrosion potential in reinforcing steel spacing and clearances.
   c. Soil sulfate content is not expected to induce significant negative reactions with concrete. However, concrete mix designs shall demonstrate aggregate does not have the potential for alkali-silica reactivity (ASR).
   d. Site soil is applicable for Types I/II cement.

Seismicity and Liquefaction Potential

GPI utilized site soil and geologic data, the project location, the *American Society of Civil Engineers* (ASCE) *Standard 7-22 - Minimum Design Loads for Buildings and Other Structures* to establish a Seismic Site Class "C" at the project site. We recommend seismic design reference the parameters provided in Table 4, based on the soil conditions and project location. The risk-targeted maximum considered earthquake (MCE_R) spectral response acceleration parameters provided in Table 4 have been modified from a Site Class B to a Site Class C (standard acceleration coefficients for Site Class B multiplied by the Site Class Factors for Site Class C). The design spectral acceleration parameters provided in Table 4 are equal to 67 percent of the Risk Targeted MCE_R acceleration parameters.

Table 4. Seismic Response Criteria (ASCE 7-22)[1]

Period (seconds)	Standard Acceleration Coefficients for Site Class B (g)[2]	MCE_R Spectral Acceleration Parameters for Site Class C (g)[3]	Design Spectral Acceleration Parameters for Site Class C (g)
0.0 (Peak)	-	$PGA_M = 0.09$	-
0.2(Short)	$S_S = 0.20$	$S_{MS} = 0.23$	$S_{DS} = 0.15$
1.0	$S_1 = 0.08$	$S_{M1} = 0.11$	$S_{D1} = 0.07$

1. Values for location Latitude 42.585326° and Longitude -114.477036°.
2. Acceleration based on 2% probability of exceedance in 50 years.
3. Values for an ASCE Risk Category III

Liquefaction is commonly a concern for loose, fine-grained sand that is saturated. Based on exploration and well log research in the immediate project vicinity, we anticipate subsurface conditions comprise medium dense to dense silt and sand atop bedrock and groundwater within 20 feet below the ground surface. Based on these conditions and laboratory testing and analysis, we estimate the safety factor against liquefaction during an earthquake with the design return period of 2,475 years (i.e., 2% probability of exceedance in 50 years) will not drop below 1.5. Therefore, liquefaction is not a significant risk at the site.

Concrete Slab-On-Grade Floors

We recommend concrete slab-on-grade floors be supported by a minimum 0.8 feet of CA-1 meeting the requirements in Table 1. This assumes subgrades will be prepared beneath slabs per the *Earthwork* report section. Slabs must be designed for the anticipated use, traffic, and equipment or storage loading conditions. For subgrades comprising native silt with sand or sandy silt prepared per the requirements outlined herein, concrete slab design may utilize an allowable modulus of subgrade reaction (k) of 215 pounds per cubic inch (pci). To realize the estimated subgrade modulus, drained conditions and a minimum 0.8 feet of CA-1 must be provided over approved subgrade soil. Higher subgrade modulus values are available with thicker CA-1 sections.

Moisture Protection

We recognize that the planned improvements for this facility may not substantially benefit from installing a vapor retarder. Further, the proposed building will be insulated and heated, which will reduce the potential for frost heave. Typically, exposed concrete floors or open-air concrete aprons will adequately convey water vapor through the slab without condensing at the surface. If this is the case for the floors planned in the treatment building or if equipment and stored materials are not sensitive to moisture vapor, retarders may be omitted.

Interior floor slabs may be susceptible to moisture migration caused by subsurface capillary action and vapor pressure. Moisture migration through floor slabs can break down a floor covering, its adhesive, or cause various other floor covering performance problems. Specifically, GPI has observed various projects where inadequate vapor protection caused significant damage to moisture-susceptible flooring systems. Often, these moisture problems were associated with either no moisture protection below the slab or, alternatively, with improperly sealed sub-slab penetrations that allowed vapor migration and damage to the flooring system. Plumbing penetrations are notoriously problematic for under-slab vapor protection.

Where floor coverings or moisture sensitive features are planned, install vapor retarders beneath the slab consisting of thick, puncture-proof polyethylene sheeting, such as Stego Wrap™, a 15-mil retarder. From our experience, IBC requirements, and American Concrete Institute (ACI) guidelines, we recommend placing vapor retarders atop the CA-1 layer immediately beneath the floor slab. Where floor coverings or other moisture sensitive building features are not planned, moisture vapor retarders may be omitted at CSI's election.

Form stakes, piping, or other sub-slab penetrations must never penetrate the vapor retarder. Carefully design and construct any vapor retarder penetrations to reduce vapor transport through such penetrations. Even if these recommendations are used, water vapor migration through the concrete floor slab is still possible. Floor coverings should be selected accordingly and, when practical, flooring manufacturers should be consulted regarding moisture barriers, their location, and product warranties. Manufacturer's recommendations should be strictly followed. Where vapor retarders are utilized, the flooring and concrete slab contractors, as well as the plastic sheeting manufacturer, should be consulted regarding additional slab cure time requirements and/or the potential for slab curling.

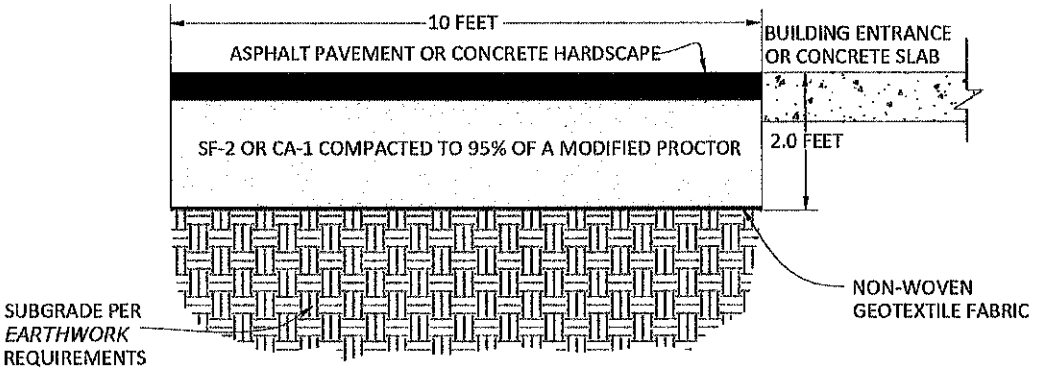
Site Drainage

Surface water can impact construction if not managed appropriately. Aggressive surface drainage and potentially dewatering measures should be expected during precipitation to reduce over-excavation and re-work required due to saturated surface soil. Additionally, surface runoff from impervious areas onto adjacent gravel work areas can degrade the gravel section, requiring continuous maintenance.

Runoff from precipitation or snowmelt must be routed away from structures to the maximum extent practical and must not be allowed to infiltrate or be diverted towards foundations, pavements, exterior flatwork, or slab subgrades. Runoff or water migrating along the ground surface must be conveyed away from structures by an appropriately designed series of catch basins, ditches, swales, or other surface water management procedures. Provide roof gutters and downspouts but do not connect them to foundation drains.

On-site soil is susceptible to frost heave, especially at interior and exterior hardscape transitions. Well-designed site drainage and careful final grading will help limit moisture infiltration near building and paved areas, which will help reduce impacts from frost heave, vapor intrusion to interior spaces, and help improve long-term performance of the structures. CSI should consider excavating the soil at building entrances (entryways, maintenance doors, etc.) to the frost depth and replace it with non-frost-susceptible soil. This process should extend laterally at the exterior at least 10 feet, illustrated in Figure 1.

Figure 1. Reduced Frost Heave Schematic



We recommend the ground surface outside the structure be sloped at least 5 percent away for a minimum of 10 feet to rapidly convey surface water or roof runoff away from foundations. We recommend elastomeric sealant be considered between hardscapes and foundation walls to reduce moisture infiltration at joints near structures. Site grades beyond 10 feet from structures should slope at least 2 percent away and toward acceptable areas, as determined Keller's grading design. *Americans with Disabilities Act* (ADA) hardscapes may not meet the site grading recommendations adjacent to structures. We recommend ADA-pertinent hardscapes be sloped away from structures to the maximum extent practical.

Foundation Drainage

Maintaining uniformly drained conditions is critical to long-term foundation performance. Therefore, we recommend foundation drains be installed around the building perimeter to route water away from foundation subgrades to dedicated stormwater disposal areas. Plate 2 presents an example of a foundation wall drainage system.

Foundation drains can intercept irrigation or stormwater that can infiltrate below the structure, thus reducing the potential for mold, odor, moisture vapor, and potential risks created by moist conditions. Also, foundation drains can help protect the structure against subsurface water fluctuations instigated by area irrigation and nearby developments. Many of these conditions can aggravate foundation and slab settlement potential.

Infiltration Testing

GPI accomplished 1 infiltration test in test pit TP-23091A-1 referencing the "Single-Ring Infiltrometer" method. We performed the test at approximately 4 feet below the ground surface in the silt with sand. The infiltration test yielded an unfactored falling head infiltration rate of 2.4 inches/hour. The infiltration rate was sufficiently slow that at a constant head test was not practical. Based on the conditions encountered in explorations, we consider this infiltration rate representative of the majority of the site soil profile within the upper 8 feet below the ground surface.

Groundwater was not encountered during exploration and is not anticipated to limit vertical infiltration. However, moderately cemented caliche was encountered during exploration and is considered a vertical limiting layer.

Safety factors for infiltration facilities in various regional municipalities typically range from 2 to 4. We recommend using a safety factor of at least 3 on field-measured infiltration rates based on the variable silt content we observed during exploration and field testing. We recommend stormwater disposal facilities maintain at least 30 lateral feet from buildings and be established downgradient of foundation bearing surfaces and pavement subgrades. Further, we recommend specifying an infiltration test at the conclusion of construction using design head elevations to verify design infiltration rates.

Referencing other jurisdictional stormwater management guidelines, our opinion is the soil at the site maintains "high" vadose zone treatment capacity. The City requires a minimum of 4 feet of vertical separation between the stormwater disposal facility invert and the highest known groundwater table or bedrock contact. Based on our exploration results and the anticipated groundwater conditions, a minimum 4 feet of vertical separation will be achieved. Additionally, the site soil meets City requirements for stormwater treatment. GPI will remain available to consult with Keller and DPW regarding stormwater management design at the site.

Pavement Section Thickness

The following pavement section design recommendations are provided referencing the *American Association of State Highway and Transportation Officials* (AASHTO) *Guide for Design of Pavement Structures 1993* (Guidelines). GPI estimated traffic loading and design parameters based on our discussions with Keller, the conceptual site plan provided, our experience with similar developments, typical pavement design criteria in the southern Idaho region, results from laboratory testing, and the subsurface conditions encountered. We recommend Keller and DPW review and validate these traffic loading assumptions, or provide actual traffic loading estimates so we can refine the pavement section recommendations herein. The following tables present the preliminary design parameters and references, as well as resulting pavement section design recommendations.

Table 5. Pavement Section Design Parameters

Design Parameter	Value Used	Reference
Reliability (R)	85%	AASHTO guidelines
Standard Deviation (S)	0.45 (flexible)	AASHTO guidelines
Initial Serviceability (PSI_i)	4.2	Typical southern Idaho area values
Terminal Serviceability (PSI_t)	2.2	Typical southern Idaho area values
Traffic Loading (Flexible Asphalt Pavement)	30,000 ESALS[1] (standard-duty) 250,000 ESALS (heavy-duty)	See Table 6
Design Life (Flexible Asphalt Pavement)	20 years	Typical southern Idaho area values
Resilient Modulus (M_r)	6,300 psi[2]	Based on Mr correlations to site soil
Asphalt Layer Coefficient (a_1)	0.42	Figure 2.5 AASHTO guidelines
Top Course Layer Coefficient (a_2)	0.13	Figure 2.6 AASHTO guidelines
Top Course Drainage Coefficient (m_2)	0.9	Table 2.4 AASHTO for "fair" drainage, 1 to 5 percent saturation

1. Equivalent Single Axle Loads (ESALs)
2. Pounds per square inch (psi)

Table 6. Traffic Loading Assumptions

Pavement Section Area	Traffic Loading Parameters	Frequency[1] or Value Used	EALF[2]
Standard-Duty Section (Parking Areas)	Passenger Vehicles (6,000 lb GVW)	260 trips per day	0.01
Heavy-Duty Section (Drive Lanes)	Passenger Vehicles (6,000 lb GVW)	260 trips per day	0.01
	Delivery and Refuse Trucks (48,000 lb GVW)	20 trips per week	2.50
	Semi Tractor-Trailers (80,000 lb GVW)	4 trips per week	3.19
	Low-boy Semi-Trailer (160,000 lb GVW) assumes	4 trips per week	3.94
	Annual Growth Factor	5.0%	
	Design Life	20 years (Flexible)	

1. One trip is one pass by the vehicle.
2. Equivalent Axle Load Factor; loading by one vehicle trip.

If actual traffic loading is different, GPI must review the analysis commensurate with the actual traffic loads. Based on the above pavement design parameters and our static analyses, Table 7 provides our flexible pavement design recommendations.

Table 7. Flexible Pavement Design

Pavement Section Material	Standard-Duty Section Thickness (feet)	Heavy-Duty Section Thickness (feet)	Material Specifications
Asphalt Concrete Pavement	0.21	0.33	Hot-mix asphalt (HMA) conforming to ISPWC *Section 810*.
Crushed Aggregate (CA-1)	0.75	0.75	Meeting CA-1 requirements in Table 1.
Non-woven Geotextile Fabric	Recommended	Required	Meeting requirements outlined in the *Geosynthetics* report section.

The above standard-duty sections assume *no construction or heavy traffic* will access pavements. Significant pavement damage can occur after just a single pass with heavily loaded trucks or equipment. Additionally, the above heavy-duty sections assume a maximum 32,000-lb axle load. If higher axle loads are expected, please notify GPI. We recommend asphalt pavement be compacted to a minimum of 92% of the Rice value during construction as determined by AASHTO T209.

New concrete aprons will be constructed as isolated work areas around the proposed building. GPI evaluated the concrete apron section utilizing soil engineering parameters from our field and laboratory testing and estimated heavy-duty traffic loading conditions. Based on subgrades prepared as recommended and the estimated traffic, Table 8 provides the rigid concrete section for heavy-duty traffic.

Table 8. Rigid PCC Pavement Section Design

Pavement Section Material	PCC Pavement Recommended Thickness (feet)	Material Specifications
Portland Cement Concrete	0.67	Minimum 4,000 pound per square inch (psi), 650 psi modulus of rupture concrete conforming to Section 703, latest ISPWC.
Crushed Aggregate	0.50	Conforming to CA-1 requirements in Table 1.

Concrete Apron Jointing

We recommend contraction joint spacing for concrete aprons conform to Table 9, which outlines the joint spacing used in our design. Saw cut joints must be accomplished within 24 hours after concrete placement to help reduce the potential for shrinkage cracking. Seal joints at building entrances in accordance with ACI 504 to reduce water infiltration.

Table 9. Contraction Joint Spacing Characteristics

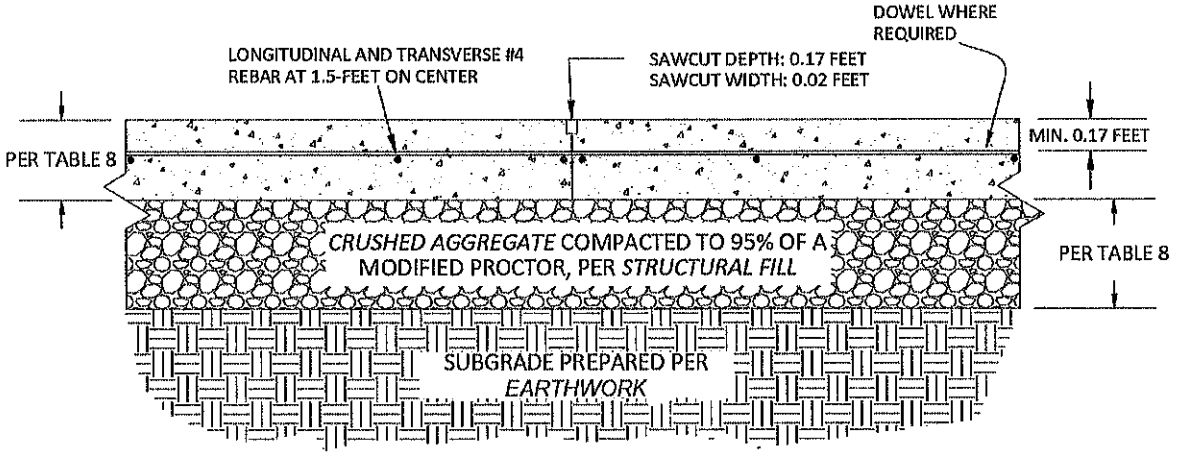
Joint Aspect	Recommended Value
Transverse Joint Spacing	12 feet maximum
Joint Width	$^1/_4$-inch minimum; $^5/_{16}$-inch maximum
Joint Depth	$^1/_3$ of pavement thickness

1. Contraction joints minimum shall be saw cut and spaced per Integrus' jointing plan.

Concrete Apron Steel Reinforcement

We recommend placing No. 4 (½-inch diameter) reinforcing steel at 1.5-foot, center-to-center spacing in a longitudinal and transverse grid pattern. Reinforcing bar steel must be rated to have minimum yield strength of 60,000 psi. Distribute the steel reinforcement on chairs or precast concrete blocks to the reinforcement position between the center of the slab and no closer than 0.17 feet from the surface of the concrete, and no closer than 0.25 feet from the earth. Maintain a minimum of 0.17 feet of clearance between the reinforcing steel and the concrete forms. Where exterior slabs abut buildings (i.e. at construction joints), install ¾-inch-diameter steel dowels, 1.5 feet long, centered on the joint, with a 1-foot, center-to-center spacing. At corners, install continuous No. 4 reinforcing steel extending 1.5 feet in each direction.

Figure 2. Typical Reinforcing Illustration



Gravel Section for Outdoor Work Areas

Gravel-surfaced work areas are planned around the new building and in between asphalt and concrete sections. Based on the anticipated traffic loading and assuming the subgrades are prepared per the *Earthwork* section requirements, we estimate 1.83 feet of CA-1 is required to support traffic loads outlined in Table 6. To reduce over-excavation and imported fill requirements, we recommend placing a separating non-woven geotextile fabric, then geogrid reinforcement atop the approved subgrade, prior to CA-1 placement. When applying geosynthetics, the required gravel section thickness is reduced from 1.83 to 1.33 feet. Applying geosynthetics will also aid in constructability and allow for reduced annual maintenance of the gravel section. We recommend gravel sections extend at least 3 feet laterally outside of the proposed travel surface. Magnesium chloride applications reduce dust and maintenance and should be considered by the project team. If used, do not apply magnesium chloride within 2 feet of concrete aprons.

Pavement Maintenance and Drainage

Crack maintenance should be accomplished on all pavement surfaces every 3 to 5 years to reduce the potential for surface water infiltration into the underlying pavement subgrade. Surface and subgrade drainage are extremely important to the performance of the pavement section. Therefore, the subgrade, crushed aggregate, and paved surfaces should slope at no less than 2 percent to an appropriate stormwater disposal system or other appropriate location that does not impact adjacent buildings or properties. Pavement performance will depend upon achieving adequate drainage throughout the section and especially at the subgrade. Water ponding at the pavement subgrade surface can induce heaving during the freeze-thaw process, which can readily damage pavement.

CSI should annually review pavement surface performance to help identify and address any pavement maintenance issues. Slurry seal applications are a common maintenance procedure for owners of asphalt pavement systems. If desired for pavement maintenance or preservation, we provide recommendations for slurry seal applications in the following items.

1. Cleaning. Ensure that cracks are thoroughly clean, dry, and free of all loose and foreign material when filling with crack sealant material. Use a hot compressed air lance to dry and warm the pavement surfaces within the crack immediately prior to filling a crack with the sealant material. Do not overheat pavement. Flame dryers are not allowed.

2. Sand Slurry. For cracks greater than 1 inch in width, fill with sand slurry by thoroughly mixing the components and pour the mixture into the cracks until full. Add additional CSS-1 cationic emulsified asphalt to the sand slurry as needed for workability to ensure the mixture will completely fill the cracks. Strike off the sand slurry, flush with the existing pavement surface, and allow the mixture to cure.

3. Hot Poured Sealant. For cracks less than 1 inch in width, fill with hot poured sealant by applying the material in accordance with these requirements and the manufacturer's recommendations. Confine hot poured sealant material within the crack. Clean any overflow sealant from the pavement surface.

GEOTECHNICAL DESIGN CONTINUITY

We base this report's information on our exploration results, observations, and communications with DPW, Keller, and Integrus. The site layout, building configuration, final floor elevation, loading conditions, drainage measures, and many other factors can significantly alter our opinions and design recommendations. Therefore, it is critical that GPI provide geotechnical continuity throughout final planning and design for the proposed construction as individual aspects become available during design development phases.

We recommend DPW or CSI retain GPI to provide continuity through construction observation and testing to document our report recommendations have been followed. Providing this design continuity throughout construction is a critical part of completing the design process. Having GPI staff review earthwork and foundation construction will help to identify potential problems, thus allowing the contractor to proactively remedy them and reduce the potential for errors and omissions.

EVALUATION LIMITATIONS

This geotechnical engineering deliverable is prepared to assist in planning, design, and construction for the proposed CSI Diesel Mechanics Facility to be located along North College Road in Twin Falls, Idaho. Our scope does not include an engineering evaluation for deep foundations, shoring, retaining walls, dewatering systems, stormwater disposal systems, interior concrete section design, landscaping, or any other service not specifically outlined herein. Changes to the planned improvements from that described herein can drastically impact our recommendations. If the improvement plans change from those described herein, we must be notified so that we may make modifications to our recommendations with respect to the modified improvements.

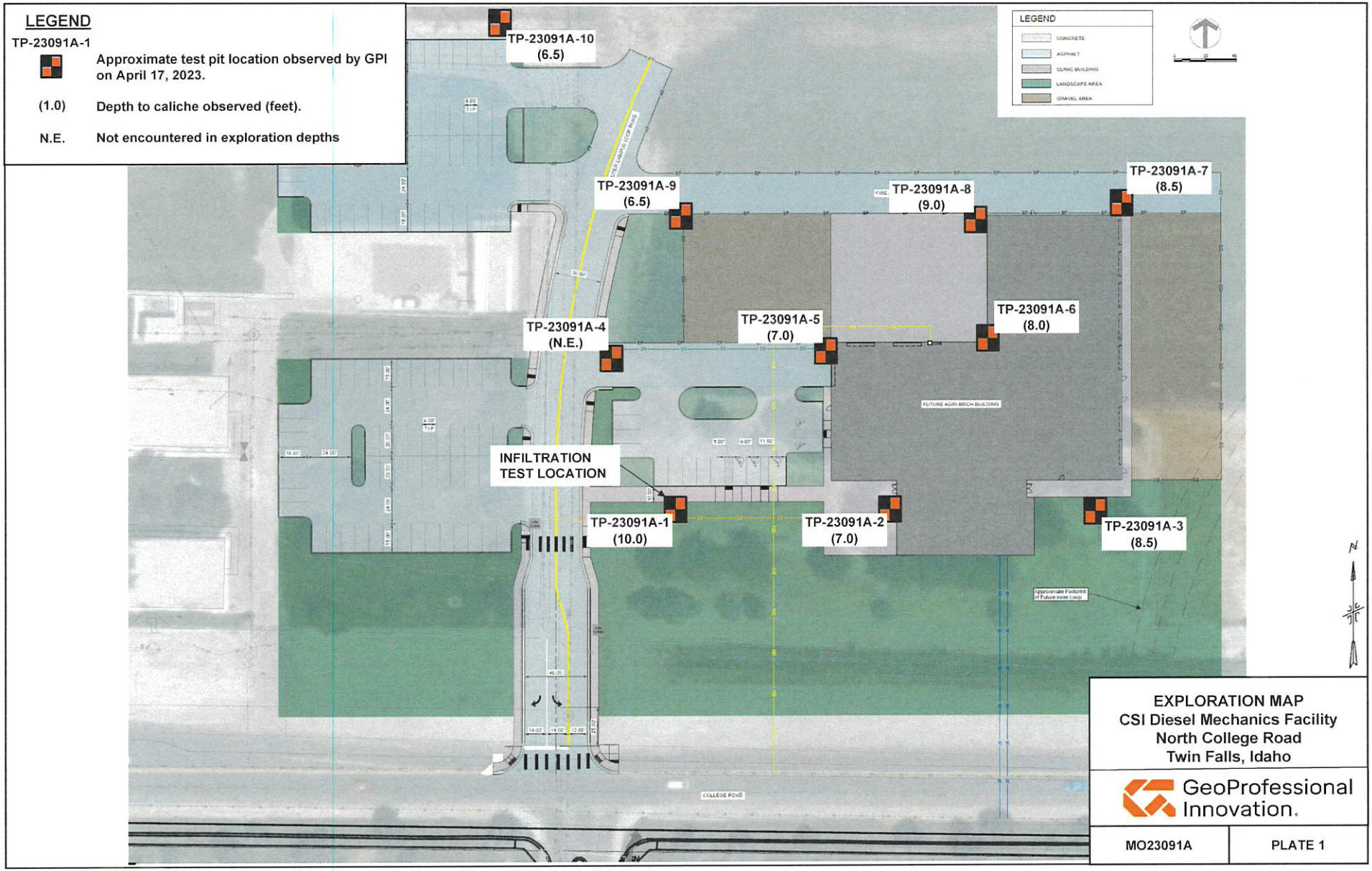
If unforeseen conditions are encountered during earthwork, provide GPI the opportunity to review our recommendations and provide necessary consultation, revision, or modifications to information contained herein. Subsurface conditions may vary from the locations explored and the extent of variation may only be known at the time of construction. Where variations occur, it is critical GPI be afforded the opportunity to modify our report to reflect the site conditions exposed.

This report was prepared for the exclusive use of DPW, CSI, and the design team members for the specific project referenced herein. GPI cannot be responsible for unauthorized duplication or reliance upon this report

or its contents without written authorization. The geotechnical recommendations provided herein are based on the premise that an adequate program of tests and observations will be conducted by GPI during construction in order to verify compliance with our recommendations and to confirm conditions between exploration locations. If a firm other than GPI is selected to perform these observations during construction, we recommend that firm issue DPW and CSI a letter stating they will implement the recommendations herein as the geotechnical engineer retained for construction. This acknowledgment is in lieu of all warranties either express or implied.

The following accompany and support this report:

Plate 1: Exploration Map
Plate 2: Foundation Drain Schematic
Appendix A: Unified Soil Classification System (USCS) and Exploration Logs
Appendix B: Laboratory Test Results



EXPLORATION MAP
CSI Diesel Mechanics Facility
North College Road
Twin Falls, Idaho

GeoProfessional Innovation.

MO23091A	PLATE 1

Reference: Preliminary site plan provided by Keller Associates, Inc. on May 9, 2023. No Scale Intended.

Foundation Drain Construction

A. Excavate the subgrade to the planned foundation bearing elevation to expose native silty with sand or sandy silt.

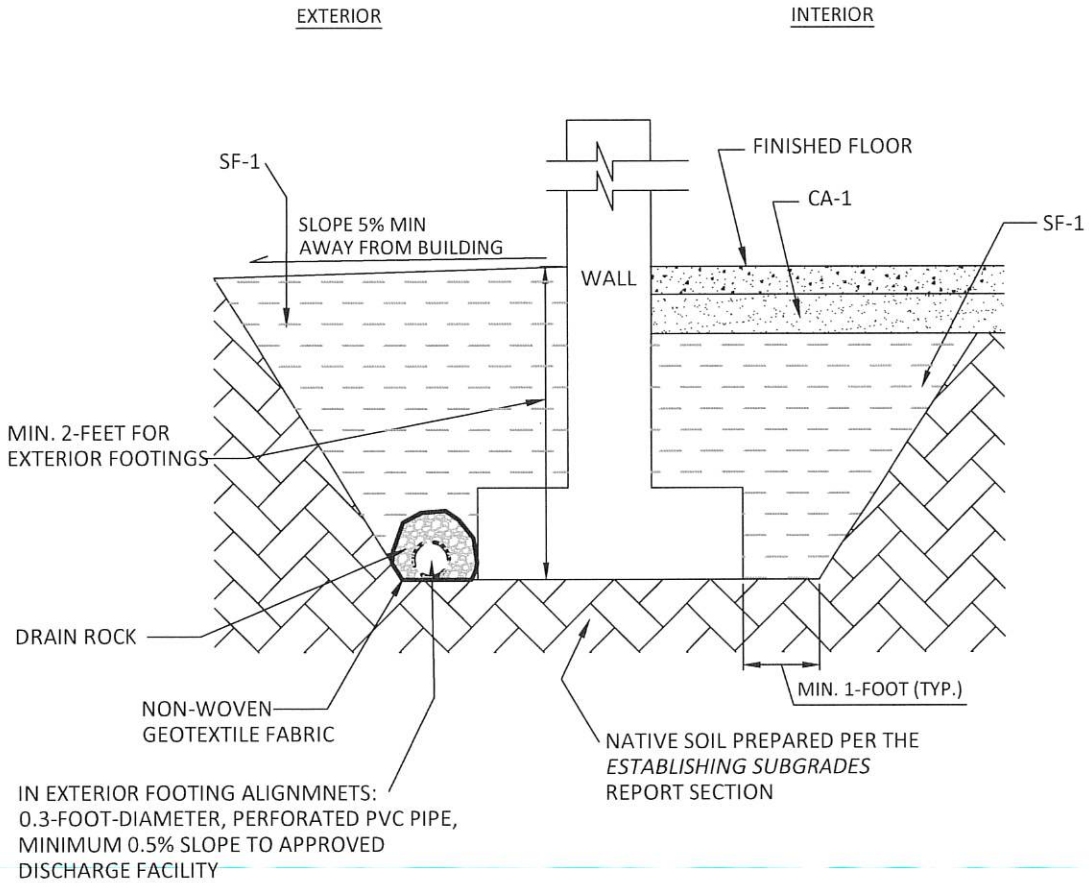
B. Prepare the exposed subgrade referencing the *Establishing Subgrades* report requirements. Geotechnical engineer to verify subgrades.

C. In exterior (perimeter) foundation alignments, place 0.3-foot-diameter, perforated PVC or ADS pipe at lowest possible elevation to maintain gravity drainage, with positive slope towards daylight or approved discharge facility. Cover pipe with drain rock and wrap with non-woven geotextile fabric.

*Fabric-wrapped drain pipe may be used instead of drain rock.

D. Backfill excavations with *General Structural Fill*, placed and compacted referencing the *Structural Fill* report section.

This drawing is intended for shallow foundations supporting isolated walls. Foundation stemwall height will vary. This is not a structural detail.



FOUNDATION DRAIN SCHEMATIC
DPW 22-091 CSI Diesel Mechanics Facility
North College Road
Twin Falls, Idaho

NOT TO SCALE

GeoProfessional Innovation®

MO23091A	PLATE: 2
DRAWN BY: JBM	CHECKED BY: TJW

APPENDIX A

Unified Soil Classification System (USCS) and Exploration Logs

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE GRAINED SOIL	GRAVEL	CLEAN GRAVEL		GW	WELL-GRADED GRAVEL, GRAVEL-SAND MIXTURES.
				GP	POORLY-GRADED GRAVEL, GRAVEL-SAND MIXTURES.
		GRAVEL WITH FINES		GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES.
				GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES.
	SAND	CLEAN SAND		SW	WELL-GRADED SAND, GRAVELLY SAND.
				SP	POORLY-GRADED SAND, GRAVELLY SAND.
		SAND WITH FINES		SM	SILTY SAND, SAND-SILT MIXTURES.
				SC	CLAYEY SAND, SAND-CLAY MIXTURES.
FINE GRAINED SOIL	SILT AND CLAY LIQUID LIMIT LESS THAN 50%			ML	INORGANIC SILT, SANDY OR CLAYEY SILT.
				CL	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, SANDY OR SILTY CLAY.
				CL-ML	INORGANIC MIXED CLAY AND SILT.
				OL	ORGANIC SILT AND CLAY OF LOW PLASTICITY.
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%			MH	INORGANIC SILT, MICA- CEOUS SILT, ELASTIC SILT.
				CH	INORGANIC CLAY OF HIGH PLASTICITY, FAT CLAY.
				OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY.
				PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS.

BORING LOG SYMBOLS

STANDARD 2 INCH OD SPLIT SPOON SAMPLE

CALIFORNIA MODIFIED 3 INCH OD SPLIT SPOON SAMPLE

ROCK CORE

SHELBY TUBE 3 INCH OD UNDISTURBED SAMPLE

TEST PIT LOG SYMBOLS

GRAB BAG SAMPLE

BG

BULK SAMPLE

BK

RING SAMPLE

RG

GROUNDWATER SYMBOLS

GROUNDWATER AFTER 24 HOURS

GROUNDWATER AT TIME OF EXPLORATION

GROUNDWATER AT THE END OF EXPLORATION

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USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, dry	0.0	ML								Trace vegetation and organics encountered to approximately 0.3 feet BGS.
LOESS - SILT WITH FINE SAND, (ML) tan to brown, dense, dry to moist	2.5			BG	82.0		7.2			Infiltration test performed at approximately 4.0 feet BGS. Unfactored Falling Head Infiltration Rate = 2.4 inches/hour Organic Content = 1.1% Cation Exchange Capacity = 14.5 meq/100g
	5.0	ML								
	7.5									
CALICHE - SILTY FINE SAND, (SM) reddish tan, very dense, moist (light calcium carbonate cementation)	10.0	SM								

Test Pit Terminated at 11.0 Feet.

Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-1	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** JBM		Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, dry	0.0	ML								Moderate vegetation and organics encountered to approximately 1.0 foot BGS.
LOESS - SILT WITH FINE SAND, (ML) tan, dense, dry to moist	2.5			BG			6.6			
		ML		RG		93.5	11.4			Trace roots encountered to approximately 5.0 feet BGS.
	5.0									
CALICHE - SILTY FINE SAND, (SM) brown, dense to very dense, moist (moderate calcium carbonate cementation)	7.5	SM		BG						
Test Pit Terminated at 9.5 Feet.										Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-2	GeoProfessional Innovation	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** JBM		Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, dry	0.0	ML								Moderate vegetation and organics encountered to approximately 0.7 feet BGS. ASTM D1557: Modified Proctor Maximum Dry Density = 107.9 pcf Optimum Moisture Content = 13.7% pH = 8.2 Resistivity = 4,170 ohm-cm Sulfates = 7.2 ppm
LOESS - SILT WITH FINE SAND, (ML) tan to brown, dense, moist	2.5	ML		BK			13.3			
	5.0									
	7.5									
CALICHE - SILTY FINE SAND, (SM) brown, dense to very dense, moist (light calcium carbonate cementation)	10.0	SM								

Test Pit Terminated at 11.0 Feet.

Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-3	GeoProfessional Innovation	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** JBM		Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, dry	0.0	ML								Trace vegetation and organics encountered to approximately 0.3 feet BGS.
LOESS - SILT WITH FINE SAND, (ML) brown, medium dense, moist				BK						
	2.5	ML								
Test Pit Terminated at 6.0 Feet.	5.0									Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-4	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** JBM		Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, moist	0.0	ML								Moderate vegetation and organics encountered to approximately 1.0 foot BGS.
LOESS - SILT WITH FINE SAND, (ML) brown, dense, moist	2.5	ML		BG			17.9			
CALICHE - SILTY FINE SAND, (SM) brown, dense to very dense, moist (light calcium carbonate cementation)	5.0 7.5 10.0	SM								
Test Pit Terminated at 12.5 Feet.	12.5									Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-5	GeoProfessional Innovation	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		Sheet 1 Of 1
Depth to Groundwater: N.E.	**Logged By:** JBM		

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, moist	0.0	ML								Moderate vegetation and organics encountered to approximately 0.7 feet BGS.
LOESS - FINE SANDY SILT, (ML) brown, medium dense to dense, moist	2.5	ML		RG	62.0	86.3	13.0			
CALICHE - SILTY FINE SAND, (SM) brown, very dense, moist (moderate calcium carbonate cementation)	5.0 7.5	SM								

Test Pit Terminated at 9.0 Feet.

Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-6	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** JBM		Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, moist	0.0	ML								Moderate vegetation and organics encountered to approximately 1 foot BGS.
LOESS - SILT WITH FINE SAND, (ML) brown, medium dense to dense, moist	2.5	ML		BG			18.7			
	5.0									
	7.5									
CALICHE - SILTY FINE SAND, (SM) brown, very dense, moist (moderate calcium carbonate cementation)		SM								

Test Pit Terminated at 9.5 Feet.

Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-7	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		Sheet 1 Of 1
Depth to Groundwater: N.E.	**Logged By:** JBM		

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, moist	0.0	ML								Moderate vegetation and organics encountered to approximately 1 foot BGS.
LOESS - SILT WITH FINE SAND, (ML) brown, medium dense to dense, moist	2.5			BG						
	5.0	ML								
	7.5									
CALICHE - SILTY FINE SAND, (SM) brown, very dense, moist (moderate calcium carbonate cementation)		SM								
Test Pit Terminated at 9.5 Feet.										Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-8	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** JBM		Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, moist	0.0	ML								Moderate vegetation and organics encountered to approximately 1 foot BGS.
LOESS - SILT WITH FINE SAND, (ML) tan to brown, medium dense to dense, moist	2.5	ML								
	5.0									
CALICHE - SILTY FINE SAND, (SM) brown, very dense, moist (light calcium carbonate cementation)	7.5	SM								
Test Pit Terminated at 8.5 Feet.										Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-9	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** JBM		Sheet 1 Of 1

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (ML) gray-brown, soft, moist	0.0	ML								Moderate vegetation and organics encountered to approximately 0.8 feet BGS.
LOESS - SILT WITH FINE SAND, (ML) whiteish tan to brown, dense, moist	2.5	ML		BG BK			4.6			
CALICHE - SILTY FINE SAND, (SM) light brown, dense, moist (light calcium carbonate cementation)	5.0	SM								
Test Pit Terminated at 7.5 Feet.	7.5									Test pit loosely backfilled with site soil.

Client: Division of Public Works	**Test Pit Number:** TP-23091A-10	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: MO23091A	**Date Excavated:** 04-17-2023		
Backhoe: VOLVO ECR 145E	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** JBM		Sheet 1 Of 1

APPENDIX B

Laboratory Test Results

GeoProfessional Innovation.

Project Name: CSI Diesel Mechanics Facility
Project Number: MO23091A
Client: Idaho Division of Public Works
Report Date: 5/9/2023

Test Results Summary

Test Pit	Depth BGS	Lab	Description	In-situ	In-situ Dry	Maximum Dry	Optimum	Atterberg Limits		#200 Sieve	pH	Resistivity	Sulfates	Organic	Cation Exchange
TP	(feet)	Number	(U.S.C.S. Classification)	Moisture, %	Density, pcf	Density, pcf	Moisture, %	Liquid Limit	Plasticity Index	Passing, %		Ω·cm	ppm	Matter, %	Capcity (meq/100g)
TP-23091A-1	4.0-4.5	14642	Silt with fine Sand (ML)	7.2	-	-	-	-	-	82	-	-	-	1.1	14.5
TP-23091A-2	2.5-3.0	14643	Silt with fine Sand (ML)	6.6	-	-	-	-	-	-	-	-	-	-	-
TP-23091A-2	4.0-4.5	14644	Silt with fine Sand (ML)	11.4	93.5	-	-	-	-	-	-	-	-	-	-
TP-23091A-3	1.0-3.0	14645	Silt with fine Sand (ML)	13.3	-	107.9	13.7	-	-	-	8.2	4,170	7.2	-	-
TP-23091A-5	2.0-2.5	14646	Silt with fine Sand (ML)	17.9	-	-	-	-	-	-	-	-	-	-	-
TP-23091A-6	3.5-4.0	14647	Fine Sandy Silt (ML)	13.0	86.3	-	-	No value	Non-plastic	62	-	-	-	-	-
TP-23091A-7	2.5-3.0	14648	Silt with fine Sand (ML)	18.7	-	-	-	-	-	-	-	-	-	-	-
TP-23091A-10	2.0-2.5	14649	Silt with fine Sand (ML)	4.6	-	-	-	-	-	-	-	-	-	-	-

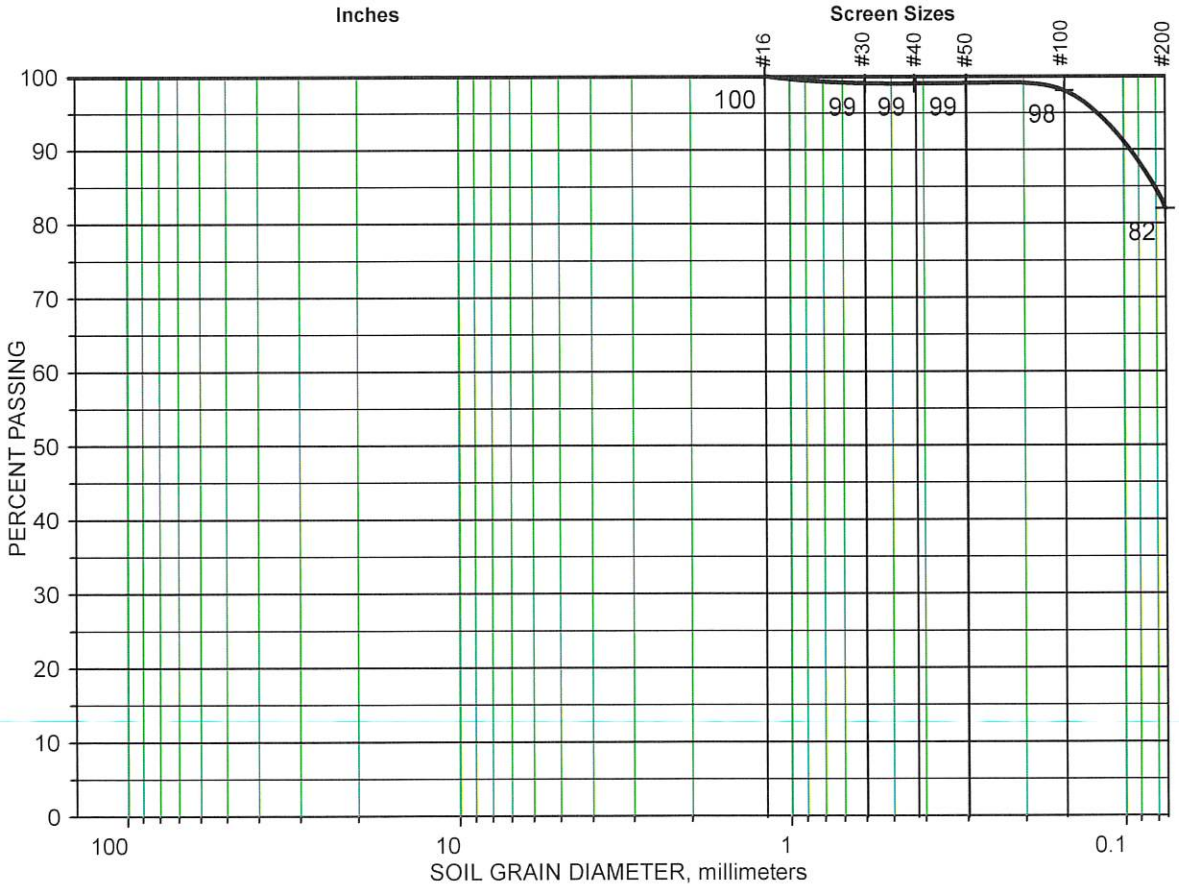
Reviewed by: _____

GRADATION ANALYSIS

ASTM D6913

Project Name: CSI Diesel Mechanics Facility
Project Number: MO23091A
Client: Idaho Division of Public Works
Lab Number: 14642
Sample Location: TP-23091A-1 @ 4.0-4.5 feet BGS
Sample Classification: Silt with fine Sand (ML)
Date Tested: 05/01/2023 By: LMC

Cobbles	Gravel		Sand		
	Coarse	Fine	Coarse	Medium	Fine



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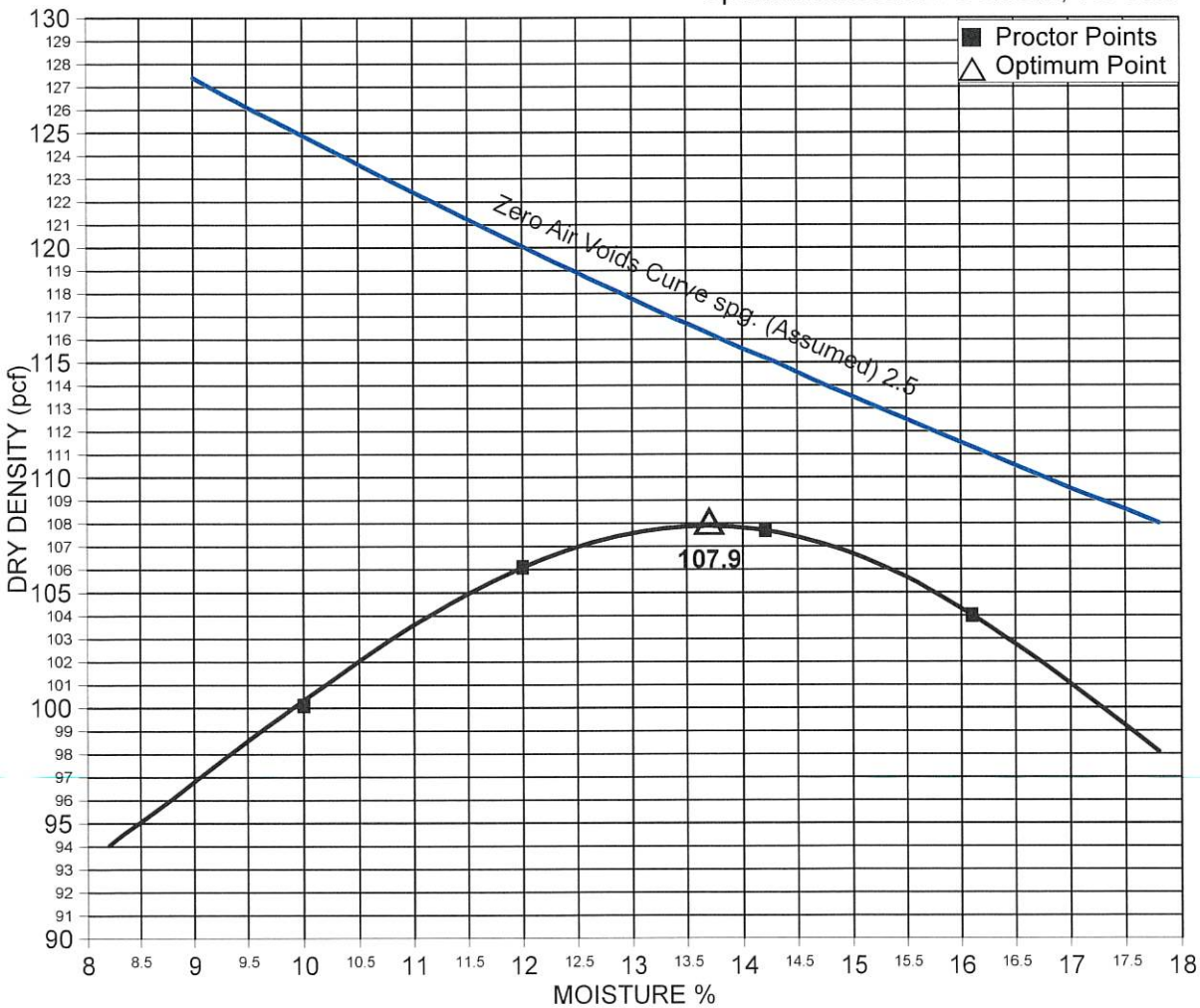
MOISTURE-DENSITY RELATIONSHIP CURVE
ASTM D 1557
Method A

GRADING ANALYSIS

SCREEN SIZE	% PASSING	AS TESTED
No. 4	100	100

Project Name: CSI Diesel Mechanics Facility
Project Number: MO23091A
Client: Idaho Division of Public Works
Lab Number: 14645
Sample Location: TP-23091A-3 @ 1.0-3.0 feet BGS
Sample Classification: Silt with fine Sand (ML)
Date Tested: 05/01/2023 By: LMC
Rammer Type: Manual

Maximum Dry Density, pcf : 107.9
Optimum Moisture Content, %: 13.7



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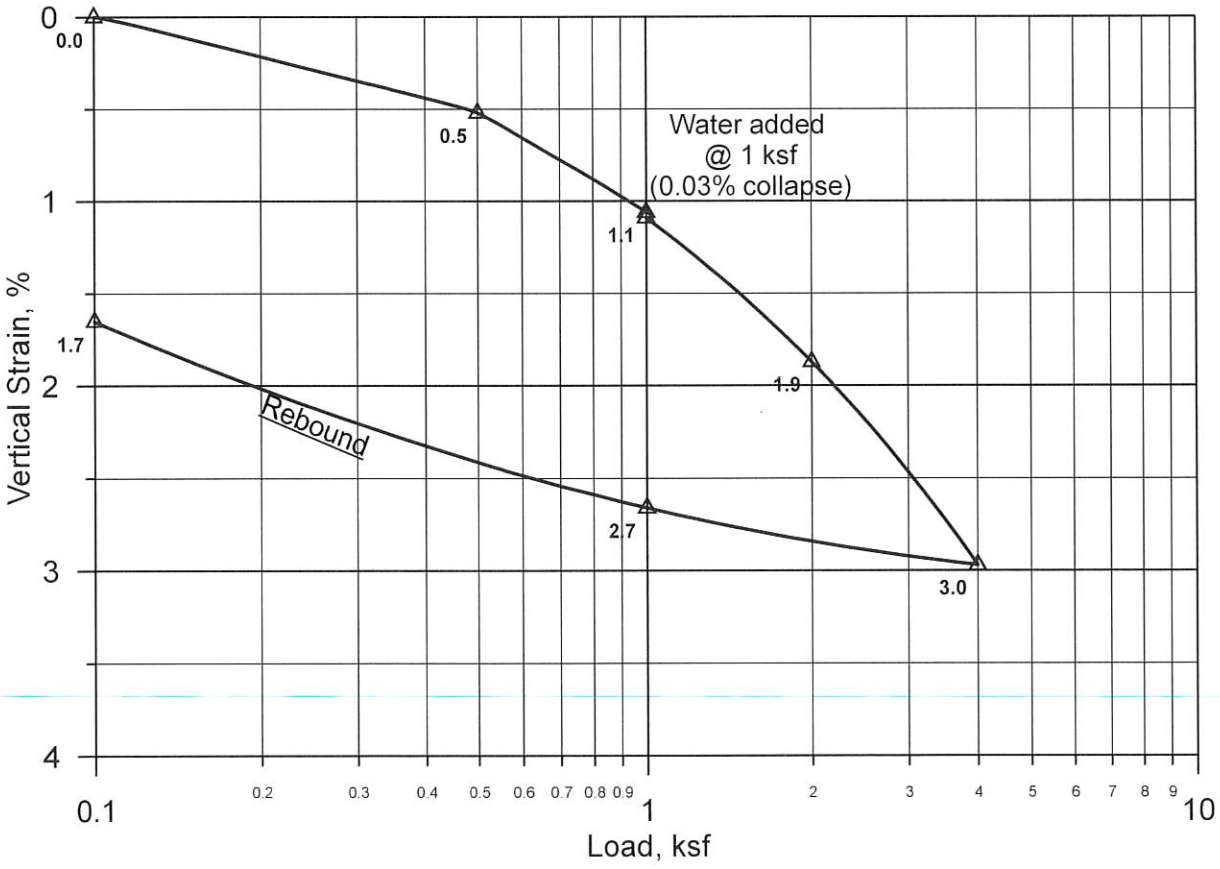
CONSOLIDATION TEST RESULTS
ASTM D 2435 (Method A)

Project Name: CSI Diesel Mechanics Facility
Project Number: MO23091A
Client: Idaho Division of Public Works
Lab Number: 14645
Sample Location: TP-23091A-6 @ 3.5-4.0 feet BGS
Sample Classification: Fine Sandy Silt (ML)
Sample: In-Situ Tube (Condition: Good)
Date Tested: 04/25/2023 By: LMC
Sample Dry Unit Weight: 86.3 pcf
In-Situ Moisture Content: 13.0%
Atterberg Limits: LL=No Value, PI=Non-Plastic



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