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PROJECT NO. 225096-001

CITY OF PENDLETON

TECHNICAL SPECIFICATIONS

WWTRRF 2025 IMPROVEMENTS

Operational Buildings

Volume 1

PREPARED BY



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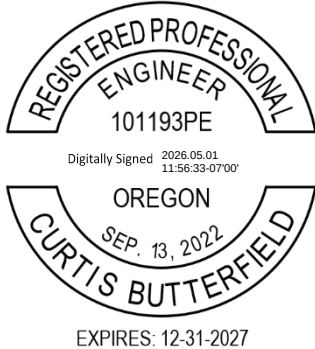
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SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Work to be performed under this Contract shall consist of furnishing tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The Work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the Owner. The Contractor shall provide all materials and equipment required for construction of the facility.
- B. The Contractor is responsible to follow the provisions of these Contract Documents, including but not limited to the following of Plans and Specifications; the timely, complete, and accurate submittal of shop drawings; the work of and correlation with their subcontractors and suppliers, timely performance of the Contract, and timely payment of suppliers and subcontractors. Nothing stated in the Contract Documents or Specifications shall be construed to relieve the Contractor of these basic responsibilities.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work involves construction of new operations facilities and improvements at the City of Pendleton Wastewater Treatment and Resource Recovery Facility (WWTRRF), including construction of a new Administration Building, improvements and renovations to the Existing Administration Building, construction of a new Storage Building, and associated work as shown on the drawings and outlined in the specifications.
- B. Demolition activities in the base bid include demolition of:
 - 1. Existing Chemical Storage Building (see sheet C-111, designator building I) located south of the Secondary Clarifier East.
 - 2. Miscellaneous concrete, asphalt, and fencing in conflict with New Administration (Structure F) and Storage Building (Structure G) footprints.
 - 3. Miscellaneous piping and utilities as shown on the drawings.
 - 4. Demolition includes removal and disposal of discarded materials.
- C. Construction activities in the base bid include construction of:
 - 1. New Administration Building (Structure F): A stick-framed, single-story office with ADA-compliant restrooms, lockers, showers, operations room, server, breakroom, and conference room.

2. New Storage Building (Structure G): A new steel building with space for chemical storage with recessed secondary containment, multiple accessory rooms, mezzanine, and code-compliant electrical service and lighting.
3. Relocation of Effluent Sampler Shed (B2) and all associated civil and electrical work.
4. Site Improvements associated with the new buildings including earthwork excavation, dewatering as necessary, yard piping and other utilities as shown on the drawings, grading, trenching, and backfilling.
5. Mechanical, electrical, plumbing, and HVAC systems required for complete and operational buildings as shown on contract drawings.
6. Construction includes procuring and installing materials as indicated in the construction drawings

D. Additive Bid Items (ABI)

1. ABI#1: Curbing paid by the unit price, as defined in Section 01 22 00 – Measurement & Payment Section 3.4.A.
2. ABI #2: Asphalt paid by the unit price, as defined in Section 01 22 00- Measurements & Payments Section 3.4.B.
3. ABI #3: Remove and dispose of portions of the Existing Administration Building (Structure H) including interior walls and saw-cutting slab as required for renovation. Renovate Existing Administration Building (Structure H): including addition of a new emergency shower, water fountain, slab repairs and replacing flooring.

1.3 CONTRACT METHOD

- A. The Work hereunder will be constructed under a single lump sum contract based on total project cost of base bid items. Additive Bid Items may be added to the project at the City's discretion.

1.4 WORK BY OTHERS

- A. The Contractor's attention is directed to the fact that work will be conducted at the site by the City staff during the performance of the Work under this Contract. The Contractor shall conduct its operations so as to cause a minimum of interference with the Work of the plant staff.
- B. Interference with Work on Utilities: The Contractor shall cooperate fully with all utility forces of the Owner or forces of other public or private agencies engaged in the construction, relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the Work, and shall schedule the Work so as to minimize interference with said construction.

1.5 CONSTRUCTION PROGRESS SCHEDULE

- A. Work under the contract shall be scheduled and performed in such a manner as to result in the least possible disruption to the operation of the existing treatment facilities. Contractor shall not operate any existing valves, pumps, or motors. The Contractor shall submit to the Engineer a construction schedule covering the entire work before any work is commenced. The schedule shall be as described in Section 01 32 16 – Construction Progress Schedule, complete with estimated dates for start and finish of each item of work. The construction constraints are as described in Section 01 35 13 – Special Project Procedures. The construction sequences described therein are suggested methods to accomplish the work. The Contractor shall remain responsible for the successful completion of all work.
- B. To minimize the period of disruption of plant operation, all new piping and/or facilities should be constructed and all preparations shall be made for fast connection to existing piping and facilities.
- C. Submit preliminary construction progress schedules as required in the General Conditions within ten (10) days after the award of the contract. The progress schedule is to be in reproducible form and subject to the approval of the Engineer.
- D. Commence work on or before a date to be specified in a written "Notice to Proceed" and complete all phases of the work as specified within Contract Documents.

1.6 PUBLIC WORKS CONTRACTOR'S LICENSE

- A. Any Contractor, Subcontractor, or Specialty Contractor is required to have a current license as a Public Works Contractor in the State where the work is to be completed in order to submit a bid or proposal on this contract.

1.7 CODES AND STANDARDS

- A. Where codes and standards are referred to, they are the current approved codes. It is the duty of the Contractor to obtain from its supplier and submit evidence, if requested, that provided material is in compliance with the applicable codes and standards.

1.8 STATE AND LOCAL LAWS

- A. Conform to all applicable State and local laws in carrying out obligations under the contract.
- B. Meet the requirements and recommendations of the Manual of Accident Prevention in Construction; Associated General Contractors of America, Inc., and Occupational Safety and Health Act.

1.9 PERMITS

- A. The Contractor shall be responsible to obtain and pay for all construction and inspection permits as required.
- B. Construction Stormwater General Permit shall be obtained from Oregon Department of Ecology, in accordance with Section 01 57 23 – Temporary Stormwater Pollution Control

- C. Building and plumbing permits shall be obtained from the City of Pendleton. For bidding purposes, Contractors shall include an allowance to cover fees for these permits in accordance with Section 00 21 13 – Instructions to Bidders; the Contract shall be adjusted after the final permit fees are established.
- D. Electrical permits shall be obtained from the Oregon Building Code Division (BCD) Fee worksheets and tables are available on the BCD website.

1.10 WAGE RATES

- A. All contractors and subcontractors performing work on the Project shall comply with state Prevailing Wages on Public Works as applicable to the project. Prevailing wages for Umatilla County are available on the Oregon Bureau of Labor and Industries (BOLI) website.

1.11 AMERICAN IRON AND STEEL

- A. In accordance with the current SRF Assistance AIS requirements, all of the iron and steel products used in this project shall be produced in the United States, except those iron and steel products that are specifically excluded (see SRF Form 6-B) or for which a waiver has been issued.
- B. Documentation including certificates of compliance (SRF Form 6-B) shall be submitted for approval by the Contractor prior to purchase of AIS iron and steel products.
- C. Refer to EPA website for more details:
 - 1. <https://www.epa.gov/cwsrf/state-revolving-fund-american-iron-and-steel-ais-requirement>
 - 2. <https://www.epa.gov/system/files/documents/2025-06/wifia-ais-waiver-request-form.pdf>

1.12 BUILD AMERICA, BUY AMERICA (BABA)

- A. BABA requirements have been waived by CWSRF.

1.13 NON-DISCRIMINATION AND EQUAL EMPLOYMENT OPPORTUNITY

- A. The Contractor shall comply with all applicable federal, state, and local laws, regulations, and executive orders relating to equal employment opportunity and non-discrimination.
- B. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, national origin, age, disability, marital status, veteran status, or any other characteristic protected by law. The Contractor shall take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to these characteristics. Such action shall include, but not be limited to, employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

C. The Contractor shall comply with:

1. Title VI of the Civil Rights Act of 1964, as amended;
2. Executive Order 11246, as amended, and implementing regulations (41 CFR Part 60);
3. Section 504 of the Rehabilitation Act of 1973;
4. The Americans with Disabilities Act (ADA);
5. The Age Discrimination Act of 1975;
6. EPA regulations governing State Revolving Fund (SRF) assistance agreements; and
7. Oregon Revised Statutes (ORS) 279C.800–279C.870 and applicable Oregon Bureau of Labor and Industries (BOLI) rules.

D. The Contractor shall include the provisions of this section in every subcontract and shall require each subcontractor to take appropriate action to comply. Failure by the Contractor to comply with these requirements may result in sanctions, termination of the contract, or other remedies provided by law.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 01 11 00



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SECTION 01 14 13 - ACCESS TO SITE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the Work. It shall be the Contractor's responsibility to construct and maintain any haul roads required for its construction operations.
- B. Work under this Section applies only to the construction of the New Administration Building, Existing Administration Building, Storage Building, and associated site improvements.

1.2 TEMPORARY CROSSINGS

- A. General: Continuous, unobstructed, safe, and adequate pedestrian and vehicular access shall be provided within the WWTRRF site.

Safe and adequate public transportation stops and pedestrian crossings at intervals not exceeding 300 feet shall be provided. The Contractor shall coordinate with plant staff to maintain scheduled deliveries (chemicals, parts, fuel) and waste removal activities. Vehicular access to residential driveways shall be maintained to the property line except, when necessary, construction precludes such access for reasonable periods of time.

1.3 CONTRACTOR'S WORK AND STORAGE AREA

- A. The Owner will designate and arrange for the Contractor's use, a portion of the property adjacent to the Work for its exclusive use during the term of the Contract as a storage and shop area for its construction operations on the Work. At completion of Work, the Contractor shall return this area to its original condition, including grading and landscaping.
- B. The designated staging area shall be coordinated to avoid interference with ongoing WWTRRF operations and solids handling activities.
- C. The Contractor shall make its own arrangements for any necessary off-Site storage or shop areas necessary for the proper execution of the Work.
- D. The Contractor shall construct and use a separate storage area for hazardous materials used in constructing the Work as specified in Section 01 57 23 – Temporary Stormwater Pollution Control.

1. For the purpose of this paragraph, hazardous materials to be stored in the separate area are all products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, two-part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.
2. Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.
3. The Contractor shall develop and submit to the Engineer a plan for storing and disposing of the materials above.
4. The Contractor shall obtain and submit to the Engineer a single EPA number for wastes generated at the Site.
5. The separate storage area shall meet all the requirements of all authorities having jurisdiction over the storage of hazardous materials.
6. The separate storage area shall be inspected by the local Fire Chief prior to construction of the area, upon completion of construction of the area, and upon cleanup and removal of the area.
7. All hazardous materials which are delivered in containers shall be stored in the original containers until use. Hazardous materials which are delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

1.4 PARKING

A. The Contractor shall:

1. Provide temporary parking areas for its employees and construction equipment.
2. The Contractor shall direct its employees to park in areas indicated.
3. Traffic and parking areas shall be maintained in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The Contractor shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.
4. Provide temporary parking areas adjacent to the Engineer's construction trailer (2 spaces for Engineer and 1 space for Owner), if applicable.

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PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 01 14 13



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SECTION 01 22 00 - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Measurement and payment will be made as specified in this Section and in accordance with the provisions of the General Conditions.
- B. The Contractor is informed that 2% of the total Contract Price will be deducted from any money due the Contractor as progress payments until the Original CPM Schedule Submittal outlined in Section 01 32 16 (Construction Progress Schedule) has been completed as specified. The aforementioned amount will be retained by the Owner as agreed, estimated value of completing the original schedule. Any such retention of money for failure to complete all such mobilization items as a lump-sum item shall be in addition to the retention of any payments due to the Contractor as specified in the General Conditions of the Contract.
- C. The Contractor is alerted to the provisions in Section 3.1 of Section 01 71 13 regarding payment provisions for Mobilization.
- D. The Contractor is alerted to the provisions in Section 1.4 of Section 01 78 23 regarding payment provisions as it relates to the Owner's Manual submittal.

1.2 MEASUREMENTS FOR PAYMENT (UNIT PRICE ITEMS)

- A. Unit price Additive Bid Items found in Division 00, Section 3.0 – Proposal, shall be paid based on a measurement basis. The construction engineer or Owners representative shall approve quantities prior to beginning work.
- B. All lump sum Bid Items and ABI's shall be paid based on the Schedule of Values prepared and approved by the Owner.

1.3 SCHEDULE OF VALUES (LUMP SUM ITEMS)

- A. The Contractor shall prepare and submit a detailed Schedule of Values to the Engineer within 30 days from the effective date of the Contract. The detailed Schedule of Values shall be based on the values listed in the Bid Schedule. Because the ultimate requirement is to develop a detailed Schedule of Values, sufficient detailed breakdown shall be provided to meet this requirement. The Engineer shall be the sole judge of acceptable numbers, details and description of values established. If, in the opinion of the Engineer, a greater number of Schedule of Values items than proposed by the Contractor are necessary, the Contractor shall add the additional items so identified by the Engineer.
- B. The minimum detail of breakdown of the major Work components is indicated.
 - 1. Mobilization and demobilization 2% of contract price - no breakdown required.
 - 2. Bonds and insurance.

3. Construction schedule.
 4. Civil site work shall be broken down into individual piping, rough grading, finish grading, site asphalt, site concrete, excavation, demolition, and any other items determined to be necessary for the establishment of pay items.
 5. Buildings shall be broken down into foundation, walls, roofs, decks, insulation, doors/windows/louvers and any other items determined to be necessary for establishment of pay items.
 6. HVAC and Plumbing mechanical work shall be broken down to rough-in and finish or trim stages.
 7. The electrical work shall be broken down into site electrical, rough-in and trim or finish electrical.
 8. All other Work not specifically included in the above items shall be broken down as necessary for establishment of pay items.
- C. The Contractor, Engineer, and Owner shall meet and jointly review the detailed Schedule of Values within 35 days from the date of Notice to Proceed. The value allocations and extent of detail shall be reviewed to determine any necessary adjustments to the values and to determine if sufficient detail has been proposed. Any adjustments deemed necessary to the value allocation or level of detail shall be made by the Contractor and a revised detailed Schedule of Values shall be submitted within 40 days from the date of Notice to Proceed.

1.4 CHANGES TO SCHEDULE OF VALUES

- A. Changes to the schedule of values shall be made to reflect Owner approved change orders.
- B. In the event that the Contractor and Engineer agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values, increases and equal decreases to values.

1.5 TECHNICAL MANUAL SUBMITTAL

- A. Up to two percent of the Contract Price will be retained from any monies due the Contractor, if at the 75 percent construction completion point, all technical manuals have not been submitted as required by Section 01 78 23 – Operation and Maintenance Data.

1.6 CONTINGENCY ALLOWANCE

- A. None.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.1 INCIDENTAL WORK

- A. All Work not specifically identified in this Section shall be considered incidental to other items; no special payment will be given for incidental work.
- B. Prior to performing any demolition work, the area to be demolished shall be measured and agreed upon by the Engineer and Contractor. If demolition occurs prior to this measurement and agreement with the Engineer, the Engineer will measure only the area that, in the opinion of the Engineer, should have been the limits of demolition. Repairs to areas outside of these demolition limits, as determined by the Engineer, shall be replaced or reconstructed at no cost to the Owner.

3.2 BASE BID PAY ITEMS – LUMP SUM ITEMS

- A. Bid Items 1 through 5. See Division 00, Section 3.0 Proposal for list of bid items and Drawings and Specifications for project details

3.3 ADDITIVE BID ITEMS – LUMP SUM ITEMS

- A. ABI #3. See Division 00, Section 3.0 Proposal for list of bid items and Drawings and Specifications for project details

3.4 ADDITIVE BID ITEMS – UNIT PRICE ITEMS

- A. ABI #1. – Curbing
 - 1. Paid by the unit price.
 - 2. See Drawing C-112, C-113-F, C-114-G, C-500
 - 3. Includes cost of mobilization, demobilization, equipment, labor, material, overhead and profit, temporary facilities, and any other costs associated with curbing that are not specifically identified under other bid items.
- B. ABI #2. – Asphalt
 - 1. Paid by the unit price.
 - 2. See Drawing C-112, C-113-F, C-114-G, C-201-F, C-201-G and Section 32 12 16 - Asphalt Paving
 - 3. Includes all labor, materials, tools, manufacturing, delivery, handling, and equipment necessary for installing asphalt for site improvements and all other miscellaneous work or materials incidental to the work.

END OF SECTION 01 21 00



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SECTION 01 31 19 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Contractor shall attend all Project meetings. Contractor's representative shall include Supervisor or Superintendent and shall have the required authority to commit the Contractor to solutions agreed upon. Other Contractor and subcontractor representatives may attend Project meetings as desired.
- B. Contractor shall provide all pertinent Work-related reports or documents for each meeting as requested by the Owner.
- C. Engineer will record minutes of all meetings and will furnish one (1) copy to the Contractor and Owner. Recipients of copies may make and distribute such other copies as they wish.
- D. Contractor shall advise the Engineer of any inaccuracies, discrepancies, objections, or missing items in the minutes within five (5) calendar days of receipt of the minutes.

1.2 PRECONSTRUCTION CONFERENCE

- A. A preconstruction conference will be convened to designate responsible personnel, discuss scheduling, shop drawing procedures, pay applications processing, project supervision, coordination, progress reports, payrolls, labor provisions, and to establish a working understanding among the parties as to the Work. The Contractor will be responsible to have all subcontractors and major suppliers represented at the preconstruction meeting.
- B. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the Contractor prior to the meeting date. However, the Contractor should be prepared to discuss all of the items listed below.
 - 1. Status of Contractor's insurance and bonds.
 - 2. Issuance of Notice to Proceed
 - 3. Contractor's tentative schedules.
 - 4. Transmittal, review, and distribution of Contractor's submittals.
 - 5. Processing applications for payment.
 - 6. Maintaining record documents.
 - 7. Critical work sequencing.
 - 8. Field decisions and Change Orders.

9. Use of Site, office and storage areas, security, housekeeping, and Owner's needs.
 10. Major equipment deliveries and priorities.
 11. Contractor's assignments for safety and first aid.
 12. Daily Report Form.
 13. Submittal Transmittal Form which the Engineer will furnish.
- C. Unless previously submitted to the Engineer, the Contractor shall bring to the conference one copy each of the following:
1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitute or Equal submittals listed in the Bid.
 2. A list of all permits and licenses the Contractor shall obtain indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.
 3. A preliminary schedule of values in accordance with the bid schedule.
 4. A 60-day plan of operation in accordance with Section 01 32 16 – Construction Progress Schedule.
 5. Procurement schedule of major equipment and materials and items requiring long-lead time.
- D. The Engineer will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance.
- E. The Contractor and its subcontractors should plan on the conference taking no more than 1 full working day.

1.3 PROGRESS MEETINGS

- A. The Engineer will arrange and chair weekly progress meetings. These meetings will be held at the project site or virtually as decided upon between Engineer and Owner and held throughout the course of construction. The Contractor is to ensure that an authorized representative, having authority to act for and on behalf of the Contractor and having full knowledge of the Work and the contract schedule attend the meetings.
- B. Representatives of the Contractor's suppliers and subcontractors, and parties providing services for the same, may attend the meeting if the Contractor elects to invite them to assist the Contractor's representatives at the meetings.
- C. Relay agenda items to Engineer at least 24 hours prior to meeting.
- D. Suggested Agenda
1. Review of Work progress

2. Field observations, problems, and conflicts
3. Problems that impede construction schedules
4. Review of off-site fabrication and delivery schedules
5. Corrective measure and procedures to regain projected schedules
6. Revisions to construction schedules
7. Plan progress schedules during succeeding work period
8. Coordination of schedules
9. Review submittal schedules, field orders, change orders, RFIs, and pay applications; expedite as required
10. Maintenance of quality standards
11. Review proposed changes for effect on construction schedules and on completion dates
12. Other business

1.4 OTHER MEETINGS

- A. Other meetings will be held from time to time as may be requested by the Owner or Contractor. Time and place of meeting shall be as mutually agreed upon. Those required to be in attendance at meetings shall be as requested.
- B. Other meetings shall also include meetings with regulatory agencies. When requested, the Contractor shall attend meetings held or required by governmental regulatory agencies having jurisdiction of the Work.
- C. Other meetings also include Post-Construction Conference. The Post-Construction Conference will be held prior to initial acceptance of the Work to discuss and resolve all unsettled matters.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 01 31 19



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SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Scheduling of the Work shall be performed by the Contractor in accordance with the requirements of this Section. The purpose of the Construction Schedule is to allow the Contractor to prepare an orderly plan to aid in the timely completion of the project.
- B. Development of the schedule and project status reporting requirements of the Contract shall employ computerized Critical Path Method (CPM) scheduling.
- C. The approved Construction Schedule shall be used to plan and execute the Work, to measure the progress of the Work, and to aid in evaluating time extensions.
- D. Failure to maintain the Construction Schedule in an approved status may result in the Owner withholding a monetary penalty against the responsible Contractor(s) until the schedule is approved as set forth in 3.4 of this Section.

PART 2 - PRODUCTS

2.1 CONSTRUCTION SCHEDULE

- A. Prepare a detailed construction schedule in graphic form showing duration and proposed dates of starting and completing each major division of the Work. The schedule is to be consistent with the time and order of Work requirements of the specifications, and is to be the basis of the Contractor's operations. Prepare the schedule utilizing a Gantt chart (bar type) or similar method that connects related activities.
- B. Sufficient detail shall be included for the identification of subdivisions of the major components listed below. The major components should be broken in into activities such as excavation, foundation subgrade preparation, foundation concrete, completion of all structural concrete, CMU, roof, pump/equipment, mechanical and plumbing installation, electrical power and controls, coatings, and other activities as required.
 - 1. Notice to Proceed
 - 2. Mobilization
 - 3. Site Work
 - 4. Yard Piping
 - 5. Site Excavation
 - 6. Site Grading
 - 7. Building Foundations & Floors

8. Building Walls
 9. Building Roofs
 10. Building Mechanical
 11. Building Electrical & Controls
 12. Building Finishes
 13. Rough-in Inspections
 14. Final Inspections
 15. Substantial Completion
 16. Punchlist
 17. Final Completion
- C. Submit a horizontal bar chart with separate line for each section of Work, identifying first work day of each week.
- D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration. Clearly indicate critical path and activities/items on the critical path.
- E. Indicate estimated percentage of completion for each item of Work at each submission.
- F. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

PART 3 - EXECUTION

3.1 INITIAL SCHEDULE SUBMITTAL

- A. The Contractor shall submit two short-term schedule documents at the Pre-construction Conference which shall serve as the Contractor's Plan of Operation for the initial 60-day period of the Contract Time, and to identify the manner in which the Contractor intends to complete all Work within the Contract Time.
- B. The bar chart shall show the accomplishment of the Contractor's early activities (mobilization, permits, submittals necessary for early material and equipment procurement, and long lead, CPM submittals, initial site work and other submittals and activities required in the first 60 days).
- C. Following the Contractor's receipt of the Engineer's review comments, the Contractor shall correct the schedule to identify missing activities and relationships relevant to the Scope of Work. No time extensions will be granted to complete activities not initially included in the Contractor's Construction Schedule.

- D. To the extent that there are any conflicts between the approved Construction Schedule and the requirements of the Contract Documents, the Contract Documents shall govern.

3.2 FINAL CONSTRUCTION SCHEDULE SUBMISSION

- A. The Final Construction Schedule shall be submitted for approval within 60 calendar days after Notice to Proceed is issued. It shall provide a reasonable level of detail and a reasonable sequence of activities which represent Work through the entire project.
- B. The Construction Schedule shall show the sequence and interdependence of activities required for complete performance of the Work, beginning with Contractor's receipt of the Notice to Proceed and concluding with the date of Final Completion of the Contract. The Project Schedule shall show all activities in workdays, with allowance for holidays and the effects of normal weather conditions on outside work.
- C. The Construction Schedule shall comply with all limits imposed by the Scope of Work, with all contractually specified intermediate milestones and completion dates, and with all constraints, restraints, or sequences included in the Contract.
- D. Procurement Activities: Prepare the schedule in chronological order of submittals. Show specification section of the submittal, name of contractor and generic description of work covered. Include activities to cover the complete procurement process to include but not limited to: submittal, review, approval, resubmittal, procurement, fabrication, delivery, permits, and similar pre-construction work.
- E. Manpower:
 - 1. All activities shall have an estimate of the average number of workers per day that are expected to be used during the execution of the activity.
 - 2. Identification of any manpower, material or equipment restrictions, as well as any activity requiring unusual shift work, such as two (2) shifts per day, six (6) day work week, specified overtime, or work at times other than regular days or hours, shall clearly be identified in the Project Schedule.
 - 3. Critical or near Critical Paths resulting from the use of manpower or equipment restraints shall be kept to a minimum. (Near Critical Paths are defined as paths having 10 workdays or less of total float.)
- F. Responsibility: All activities shall be identified in the Construction Schedule by the party responsible to perform the Work. Responsibility includes, but is not limited to, the Contracting Firm, the Subcontracting Firm, Contractor Workforce, or Agency performing a given task. Activities shall not belong to more than one responsible party.
- G. Work Areas:
 - 1. Arrange the schedule to show each major area of construction for each major category or unit of Work.
 - 2. All activities shall be identified in the Construction Schedule by the Work area in which the activity occurs. Activities shall not be allowed to cover more than one work area.

- H. Modification or Claim Number: Any activity that is added or changed by a change order or used to justify any claimed time, shall be identified by change order code that changed the activity. Activities shall not belong to more than one change order.
- I. Milestones: The Construction Schedule shall start no earlier than the date that the Notice to Proceed (NTP) was issued. Milestone dates are defined in calendar days following the date set forth in the Notice to Proceed and are required to be met by all Contractors. Time is of the essence for the completion of Milestones and for the Contract Completion date.

3.3 PERIODIC SCHEDULE UPDATES

- A. Submit revised schedule with each Application for Payment, identifying changes since previous version.
- B. Provide recommendations for adjusting the Construction Schedule to meet milestone completion and Contract completion dates (include why the schedule needs adjusting, i.e., change order, weather, contractor resources, etc.).
- C. The Contractor shall prosecute the Work in accordance with the approved Construction Schedule. Out of sequence construction, defined as a change from the Construction Schedule in the Contractor's actual operation, requires prior approval from the Engineer.
- D. Upon the approval of a change order or the issuance of a unilateral change order by the Owner the agreed-upon change order activities, activity durations, logic and impacts shall be reflected in the next schedule submittal by the Contractor.

3.4 PAYMENT FOR CPM SCHEDULES

- A. The Contractor's attention is directed to the condition that 2% of the total Contract Price will be deducted from any money due the Contractor as progress payments until the Original CPM Schedule Submittal listed above has been completed as specified. The aforementioned amount will be retained by the Owner as agreed, estimated value of completing the original schedule. Any such retention of money for failure to complete all such mobilization items as a lump-sum item shall be in addition to the retention of any payments due to the Contractor as specified in the General Conditions of the Contract.
- B. Approval of subsequent monthly pay requests may be delayed unless accompanied by a copy of the monthly update to the CPM schedule as described above. Extensive delays in submission of the monthly update may constitute sufficient basis for the Engineer to recommend withholding of some or all of any payment.

END OF SECTION 01 32 16

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Wherever submittals are required hereunder, all such submittals by the Contractor shall be submitted to the Engineer as delineated in this Section.
- B. At the Pre-Construction Conference, the Contractor shall submit the following items to the Engineer for review:
 - 1. A preliminary construction schedule.
 - 2. A preliminary schedule of Shop Drawings, Samples, and proposed Substitutes ("Or-Equal") submittals listed in the Bid.
- C. The Contractor shall provide an internet-based (PROCORE) construction management software package for submitting and tracking project related documents such as RFI's and Submittals. Access to and the use of this internet-based construction management site will be provided at no cost to the Engineer and Owner.

1.2 ENGINEER'S REVIEW PERIOD

- A. For planning purposes, the Contractor shall assume a minimum of 14 days for review by the Engineer following receipt of submittal/resubmittal. If an expedited review is requested by the Contractor, the submittal shall identify the requested expedited review. The Engineer will attempt to accommodate the expedited review.

1.3 SUBMITTAL PROCEDURES

- A. Verify that the material or equipment described in each submittal conforms to all requirements of the Specifications and drawings. Where the detailed specifications require specific submittal data, submit all data at the same time. The submittals are to be accompanied by the transmittal form attached at the end of this Section. The Engineer will return for resubmittal any information not accompanied by the specified transmittal form, properly completed.
- B. Indiscriminate submittal of only manufacturer's literature is unacceptable and will be rejected.
- C. The submittals shall be numbered as XXXXXX-YY-z., where XXXXXX is the specification section number, YY is the sequential number of the submittal, and Z is used for re-submittal labeled a through z. For example, the first submittal of an item from Section 32 13 13 – Concrete for Exterior Improvements would be numbered "32 13 13-01"; the first re-submittal of the submittal would be numbered "32 13 13-01-A".
- D. A separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items

using a single transmittal form will be rejected. A multiple page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the Engineer.

- E. Identify Project, Contractor, subcontractor or supplier, pertinent Drawing sheet and detail number(s), and specifications section number, as appropriate.
- F. All Contractor shop drawings submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submission to the Engineer. Each submittal shall be dated, signed, and certified by the Contractor, as being correct and in strict conformance with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed, and certified. No consideration for review by the Engineer of any Contractor submittals will be made for any items which have not been so certified by the Contractor. All non-certified submittals will be returned to the Contractor without action taken by the Engineer, and any delays caused thereby shall be the total responsibility of the Contractor.
- G. Do not mark the submittals in red. Ensure that any marks are duplicated on all copies submitted. Outline the marks on reproducible transparencies in a rectangular box.
- H. Coordinate submission of related items.
- I. Identify variations from Contract Documents and product or system limitation which may be detrimental to successful performance of the completed Work.
- J. Provide space for Contractor and Engineer Review stamps.
- K. Submit electronic submittals to:

Mr. Curtis Butterfield
cbutterfield@kellerassociates.com
- L. Submit material samples to:
Mr. Curtis Butterfield
1060 Jadwin Ave #375, Richland, WA 99352
- M. Electronic submittals:
 - 1. Electronic submittals shall be submitted in PDF format and combined into a single file.
 - 2. Engineer will return comments only.
 - 3. Contractor is responsible for distributing copies of the submittal and Engineer's comments to concerned parties.
 - 4. Engineer may require hard copies in lieu of an electronic submittal if, in the opinion of the Engineer, the electronic submittal is difficult to read.
 - 5. Revise and resubmit submittals as required, identify all changes made since previous submittals. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable submittal to the ENGINEER by the second

submission of a submittal item. The OWNER reserves the right to withhold monies due to the CONTRACTOR to cover additional costs of the ENGINEER's review beyond the second submittal.

- N. Revise and resubmit submittals as required, identify all changes made since previous submittals.
- O. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.4 DEVIATIONS FROM CONTRACT

- A. If the Contractor proposes to provide material or equipment which does not conform to all of the Specifications and Drawings, the transmittal form accompanying the submittal copies shall indicate under "comments" the deviations.

1.5 SHOP DRAWINGS

- A. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, list, graphs, catalog sheets, data sheets, and similar items. Whenever the Contractor is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the state wherein the project is to be built, unless otherwise directed.
- B. Except as may otherwise be indicated herein, the Engineer will return submittal to the Contractor with comments. The Contractor shall make a complete and acceptable submittal to the Engineer by the second submission of a submittal item.
- C. If submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN," formal revision and resubmission of said submittal will not be required.
- D. If submittal is returned to the Contractor marked "MAKE CORRECTIONS NOTED," formal revision and resubmission of said submittal will not be required.
- E. If submittal is returned to the Contractor marked "AMEND-RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.
- F. If submittal is returned to the Contractor marked "REJECTED-RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of, said revised submittal to the Engineer.
- G. Fabrication of an item shall be commenced only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED". Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.

1.6 ORGANIZATION

- A. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components.
- B. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to specification paragraph and subparagraph, drawing number, detail number, schedule title, room number, or building names, as applicable.
- C. Unless indicated otherwise, terminology and equipment names and numbers used in submittals shall match those used in the Contract Documents.

1.7 EFFECT OF ACCEPTANCE OF CONTRACTOR INFORMATION

- A. Acceptance by the Engineer of any drawings, method of work, or any information regarding materials or equipment the Contractor proposes to provide shall not relieve the Contractor of their responsibility for any errors therein and shall not be regarded as an assumption of risk or liability by the Engineer or Owner, or by any officer or employees thereof, and the Contractor shall have no claim under the contract on account of the failure or partial failure or inefficiency of any plan or method of work or material or equipment so accepted. Such acceptance shall be considered to mean merely that the Engineer has no objection to the Contractor using, upon their own full responsibility, the plan or method of work proposed, or providing the materials or equipment proposed.
- B. Approval of shop drawings by the Engineer is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the Plans and Specifications. The Contractor is responsible for dimensions which shall be confirmed and correlated at the job site, fabrication process and techniques of construction, coordination of their work with that of all other trades and the satisfactory performance of their work.

1.8 PRODUCT DATA AND SAMPLES

- A. Where required in the Specifications and as determined by the Engineer, test specimens or samples of materials, appliances and fittings to be used or offered for use in connection with the Work shall be submitted to the Engineer at the Contractor's expense. Specimen or sample submittals shall be made with information as to their sources, with all cartage charges prepaid, and in such quantities and sizes as may be required for proper examination and tests to establish the quality or equality thereof, as applicable.
- B. All samples and test specimens are to be submitted in ample time to enable the Engineer to make any tests or examinations necessary, without delay to the Work. The Contractor will be held responsible for any loss of time due to the neglect or failure to deliver the required samples to the Engineer as specified.
- C. Samples are also to be taken during the course of the Work, as required by the Engineer.
- D. Laboratory tests and examinations that the Owner elects to make will be made at no cost to the Contractor, except that, if a sample of any material or equipment proposed for use

by the Contractor fails to meet the Specifications, the cost of testing subsequent samples will be borne by the Contractor.

- E. All tests required by the Specifications to be performed by an independent laboratory are to be made, and the samples therefore furnished shall be at the sole expense of the Contractor.
- F. Material used in the Work is to conform to the submitted samples and test certificates as approved by the Engineer.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 01 33 00

STANDARD SUBMITTAL FORM

Transmittal of Shop Drawing or Submittal

CONTRACTOR: <CONTRACTOR NAME>

Tracking No. **XXXXXX**

Item covered by this submittal

Refer to the following attachment(s) for a detailed description of the item.

Applicable specification section(s)

- ☐ First Submittal OR ☐ Resubmittal No. _____
- ☐ This item is as specified OR ☐ This item is a substitution/or equal
- ☐ Supplier/Subcontractor certifies:
- ☐ Conforms to contract
 - ☐ Minor deviations as specifically noted
 - ☐ Major deviations as specifically noted

Review Priority: ☐ 1 ☐ 2 ☐ 3

Due Date: **XX-XX-XX** (Engineer's standard review period is 14 days)

Notes to Engineer:

Date Received by Contractor: _____ Date Returned to Subcontractor/Supplier _____

Contractor Comments:

Deviations Specifically Noted

SECTION 01 35 13 – SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.1 GENERAL

The existing wastewater treatment facility must remain operational during construction. As a result, phasing and sequencing of work is critical. Contractor shall take measures to maintain the facility's existing level of treatment at all times during construction.

Temporary pumping, piping, power, lighting, controls, instrumentation, alarms, security devices, and all required safety devices shall be provided by the Contractor whenever their work or interruption due to their work affects the existing flows, treatment processes, pumping, piping, power, lighting, controls, instrumentation, alarms, etc.

- A. Critical events in the sequence of construction are described in this Section and shall be utilized by the Contractor as a guideline. The construction constraints presented do not include all items affecting the completion of the work, but are intended to describe the sequence of critical events necessary to minimize disruption to the ongoing wastewater treatment processes. It shall be understood and agreed by the Contractor that the critical events described are not all inclusive and that additional items of work not described may be required to minimize disruption and ensure compliance. Deviation from or modification of these suggested sequences is permitted if techniques and methods known to the Contractor will result in reducing the disruption of the facility operation and maintain treatment or operational efficiency, and is approved in advance by the Engineer.
- B. The construction constraints described herein shall be incorporated into the Contractor's schedule as described in Section 01 32 16 – Construction Progress Schedule.

1.2 SUBMITTALS

- A. A plan showing the size and location of the temporary facilities and piping shall be submitted to the Engineer at the same time as the outage plan required. All costs for design, provision, operation, and removal of temporary facilities and piping shall be the responsibility of the Contractor.
- B. The request for any deviation shall be submitted as a shop drawing. Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- C. Outage Plan Submittal Requirements
 - 1. Modifications to existing facilities, the construction of new facilities, and the connection of new to existing facilities will require the temporary outage or bypass of treatment processes or facilities. In these cases, the Contractor's work shall be coordinated with the operation of the plant in advance. In addition to the Construction Schedule under Section 01 32 16 – Construction Progress Schedule, the Contractor shall submit a Request for Shutdown and a detailed outage plan and time schedule for each construction activity which will require a tank, pipeline,

electrical circuit (other than lighting), control circuit, equipment, or other facilities to be removed from service.

2. The Request for Shutdown and outage plans shall be submitted to the Engineer for the Owner's review and acceptance a minimum of two weeks in advance of the time that such outages are required. The outage plans shall be coordinated with the construction schedule specified in Section 01 32 16 – Construction Progress Schedule and shall meet the restrictions and conditions specified in this section. The detailed plan shall describe the Contractor's method for preventing bypassing of other treatment units; the length of time required to complete said operation; any necessary temporary power, controls, instrumentation or alarms required to maintain control, monitoring and alarms for the treatment plant processes; and the manpower, plant and equipment which the Contractor shall provide in order to ensure proper operation of associated treatment units.

In addition, the outage plan shall describe the Contractor's contingency plan that shall be initiated in the event that their temporary facilities fail or it becomes apparent that the time constraints described in the approved Outage Plan cannot be met. The contingency plan shall conform to all specified outage requirements. All costs for preparing and implementing both the outage and contingency plans shall be borne by the Contractor.

1.3 OPERATION OF PLANT EQUIPMENT

- A. Operational functions or shutdown of the existing facility required to facilitate Contractor's operation will be done by the Owner's personnel only.
- B. The Owner's operation and maintenance personnel will cooperate in every way that is practical in order to facilitate Contractor's operation. However, certain shutdown and connections may only be permissible at times other than normal working hours such as nights or weekends. No additional payment will be made to the Contractor for any night, weekend or holiday work or overtime payments. Contractor shall be sensitive to Owner's overhead due to overtime pay and may be responsible for compensation if excessive outages are required.

If it is necessary for the proper operation or maintenance of portions of the existing facility, the Owner may require the Contractor to reschedule an approved shutdown. The Contractor shall then reschedule their operations so there shall be no conflict with necessary operations or maintenance of the plant. The Contractor shall, within two (2) working days, provide the Owner with revised Request for Shutdown and a plan for rescheduling of the work in accordance with the requirements of the Contractor's Schedule.

1.4 OUTAGE PLANS

- A. The Contractor shall not begin an alteration until specific written permission has been granted by the Engineer in each case.
- B. The Engineer will coordinate the Contractor's planned procedure with the Owner's personnel. The Engineer has the authority to modify any proposed shutdown procedures if said work would adversely impact the plant facility's operations.

- C. The Owner shall be notified in writing at least one week in advance of the required outage if the schedule for performing the work has changed or if revisions to the outage plan are required.
- D. The Contractor shall provide written confirmation of the shutdown date and time two working days prior to the actual shutdown.
- E. The making of connections to existing facilities or other operations that interfere with the operation of the existing equipment shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall be completed as quickly as possible and with as little delay as possible, and shall proceed continuously (24 hours a day and seven days a week) if necessary to complete modifications and/or connections in the minimum time.
- F. Any temporary facilities and night, weekend, or holiday work and overtime payments required during process interruptions shall be included in the bid price for the work.

1.5 CONSTRAINTS AND WORK SEQUENCE

- A. The Contractor shall be responsible for development of the construction sequencing. In implementing the construction sequencing, the Contractor shall maintain the existing facilities in service until new facilities are constructed and are operational to supplement the existing capacity. When new facilities are operational, the existing facilities may be taken out of service. The following general guidelines shall be used by the Contractor in planning the sequence of construction.
- B. The following general information and guidelines shall be used by the Contractor in planning the sequence of construction. The list is not comprehensive and items are not necessarily listed sequentially:
 - 1. Permits. Contractor shall obtain all necessary permits.
 - 2. Storm Water Pollution Prevention Plan (SWPPP). Submit Notice of Intent (NOI) and implement SWPPP measures to control storm water runoff, erosion, and discharge from construction dewatering efforts. The Contractor shall be responsible for management of storm water and sediment control measures in accordance with Section 01572 – Construction Site Discharge.
 - 3. Groundwater. Groundwater requiring significant dewatering effort is anticipated to be encountered (see Geotechnical Report).
 - 4. Uncontrolled Fill. Uncontrolled fill, likely associated with areas around the old sludge drying beds north of the new admin building, see Geotechnical Report.
 - 5. Existing Digester Lid. An existing digester lid is currently stored east of Structure G and will remain in place during the initial phases of construction. The Contractor shall plan and sequence the Work to accommodate this obstruction. Contractor is responsible for all means and methods necessary to perform excavation and construction in this area, including working around lid in its current location, providing temporary shoring, or relocating/shifting the lid up to 10 feet to the east

against the edge of pavement. Final installation of the digester lid will occur at a later phase; Contractor shall remobilize as necessary to complete existing Work.

6. Demolition. Demolition shall take place in phases, in order to maintain conveyance of wastes and existing treatment level during construction. Demolition activities include removal of existing chemical storage building and selective demolition in the existing administration building H (if selected)
7. Electrical. New electrical feed and fixtures in Structures F, G, H (if selected) will be powered via feeders from the MCC near the aeration basins.
8. Construction of new structures F & G including earthwork, concrete, wood framing, mechanical, electrical and controls.
9. Renovations to existing structure H (if selected) include earthwork, concrete, wood framing, mechanical, electrical and controls.
10. Relocate and repurpose existing shed to be used for effluent sampling.
11. Facility startup and commissioning including testing electrical, communication, plumbing, HVAC systems.
12. Site improvements including trenching, utility tie-in, backfill, compaction, grading, and landscaping.

C.

Prior to	Complete
Tying in utilities to new buildings (F, G)	Locate existing utilities, address conflicts with project engineers. Obtain necessary permits Construct new buildings
Perform demolition work on existing admin building (H)	Commission new operational buildings (F,G) Owner to move occupancy to new admin building (F)

1.6 ELECTRICAL POWER REQUIREMENTS

- A. All switching, safety tagging, etc., required for plant facility shutdown or to isolate existing equipment shall be performed by the Contractor. In no case shall the Contractor begin any work in, on, or adjacent to existing equipment without written authorization by the Engineer.
- B. The Contractor shall make all modifications or alterations to existing electrical facilities required to successfully install and integrate the new electrical equipment as indicated.

Modifications to existing equipment, panels, or cabinets shall be made in a professional manner with all coatings repaired to match existing. The costs for modifications to existing electrical facilities required for a complete and operating system shall be included in the Contractor's original bid amount and no additional payment for this Work will be authorized.

- C. Extreme caution shall be exercised by the Contractor in digging trenches in order not to damage existing underground utilities. Cost of repairs of damages caused during construction shall be the Contractor's responsibility without any additional compensation from the Owner.
- D. The Contractor shall be responsible for identifying available existing circuit breakers in lighting panels for the intended use as required by the Drawings. Costs for this Work shall be included in the Contractor's original bid amount.
- E. The Contractor shall visit the Site before submitting a bid to better acquaint itself with the Work of this Contract. Lack of knowledge will not be accepted as a reason for granting extra compensation to perform the Work.

1.7 ROAD ACCESS

The project site may be congested and the Contractor shall conduct their operations to minimize interference with others as specified in Section 01 14 13 – Access to Site. Access roads and circulation roads shall not be closed unless equivalent road access is provided and maintained.

- A. The project site entrance shall remain clear so vehicles can pull into the project site and to allow normal activities at the existing facility.

1.8 OPERATIONS AND MAINTENANCE ACCESS

- A. Owner's operations personnel must have continuous safe access to all process control equipment.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.1 GENERAL

- A. Temporary facilities and piping shall be located to minimize interference with Contractor's construction facilities and Owner's operation and maintenance of the facility. Unless otherwise specified, each temporary pipeline shall be of the same size as its connection to the existing or permanent facility at the downstream end of the pipeline with respect to the liquid or gas flow in the pipeline. Piping materials shall be suitable for the material being conveyed and be as specified in their respective specification sections.
- B. When temporary electrical power supply controls, instrumentation or alarms are required for routine continuous operations of existing or new equipment, the Contractor shall provide the necessary equipment and appurtenances for such temporary power supply

controls, instrumentation or alarms. Prior to installing said equipment and appurtenances Contractor shall provide a submittal on the proposed components and installation for Engineer's review and approval.

- C. During all rehabilitation, modification and demolition work, safe working conditions for the Owner's and Contractor's personnel shall be maintained at all times. The foregoing includes, but is not limited to, proper trench excavation, the provision of temporary equipment guards, supports, warning signs, walkways, covers over openings, handrailing and protection of electrical equipment and power supply. All temporary facilities shall be constructed in accordance with applicable codes and regulations so that they operate safely and properly. Valves to be temporarily shut off during the work shall be tagged as such and shall be wired shut with a crimped lead seal and padlocked. Electrical and mechanical equipment shall be similarly shut down.

3.2 CONSTRUCTION SEQUENCING - GENERAL

- A. A proposed sequence of construction summary and description follows. Phase 1 generally consists of construction of the new facilities, while Phase 2 includes modifications to existing facilities.
- B. Contractor shall perform all of the Work per Contractor's schedule, except for those items noted that the Owner will conduct. Contractor shall coordinate with Owner to schedule Owner-conducted tasks.
- C. Contractor shall maintain operability of must be operational at all times unless otherwise approved by the Owner in writing.
- D. Owner shall operate all treatment facilities, operate electrical breakers and disconnects, and open and close any process control valves.

3.3 PROPOSED SEQUENCE OF CONSTRUCTION

- A. Phase 1
 - 1. Locate existing utilities
 - 2. Obtain necessary building permits
 - 3. Building excavation
 - 4. Building construction
 - 5. Building utilities tie-ins
 - 6. Commission new buildings
- B. Phase 2
 - 1. Install furnishings in new admin building (F) – by Owner

2. Move occupancy to new admin building (F) – by Owner
3. Vacate existing admin building (H) – by Owner
4. Interior demolition work existing admin building
5. Complete building improvements to existing admin building (H)
6. Recommission existing admin building – now utilizes solely as a Lab

C. Phase 3

1. Remobilize after placement/relocation of digester lid
2. Complete exterior concrete work
3. Finish grade
4. Finish asphalt

END OF SECTION 01 35 13



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SECTION 01 35 53 – SECURITY PROCEDURES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall implement security procedures to ensure existing facilities and new construction are protected from vandalism, theft, and unauthorized entry. The Contractor shall:
 - 1. Initiate security program in coordination with Owner's existing WWTRRF security system and requirements during mobilization.
 - 2. Maintain security program throughout construction period until Substantial Completion.
 - 3. Protect adjacent active WWTRRF operations from unauthorized access related to construction activities.

1.2 ENTRY CONTROL

- A. The Contractor shall:
 - 1. Restrict entry of persons and vehicles into construction areas.
 - 2. Allow entry to construction area only to authorized persons with proper identification.
 - 3. Keep all Contractor employees out of existing facilities that are not being modified under the Work.
 - 4. Coordinate with Owner entry control to existing facilities that are not being modified under the Work.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 01 35 53



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SECTION 01 42 19 - REFERENCE STANDARDS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Titles of Sections and Paragraphs: Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.
- B. Applicable Publications: Whenever Specification references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids shall apply. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.
- C. Specialists' Assignments: In certain instances, specification text requires specific work be assigned to specialists or expert entities who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work. In addition, these requirements are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to or exceed the requirements of applicable codes and the applicable requirements of the following documents:
 - 1. References herein to "Building Code" shall mean current International Building Code (IBC), as adopted by the State of Oregon.
 - 2. References to "Mechanical Code" or "Uniform Mechanical Code," "Plumbing Code" or "Uniform Plumbing Code," "Fire Code" or "Uniform Fire Code," shall mean International Mechanical Code, Uniform Plumbing Code and International Fire Code of the International Conference of the Building Officials (ICBO).
 - 3. "Electric Code" or "National Electric Code (NEC)" shall mean the National Electric Code of the National Fire Protection Association (NFPA).
 - 4. The latest edition of the codes as approved by the Municipal Code and used by the local agency as of the date that the Work is advertised for bids, as adopted by the

agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

- B. In case of conflict between codes, reference standards, drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or furnishing labor. The Contractor shall bid for the most stringent requirements.
- C. The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed herein.
- D. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- E. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- F. Applicable Standard Specifications: References in the Contract Documents to "Standard Specifications" shall mean the Oregon Standard specifications for Public Works Construction, latest edition.

1.3 REGULATIONS RELATED TO HAZARDOUS MATERIALS

- A. The Contractor shall be responsible that all work included in the Contract Documents, regardless if shown or not, shall comply with all EPA regulations, OSHA/Oregon OSHA, RCRA, NFPA, Oregon DEQ requirements, and any other Federal, State, and Local Regulations governing the storage and conveyance of - hazardous materials, including petroleum products.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 01 42 19

SECTION 01 45 00 - QUALITY CONTROL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Specific quality control requirements for the Work are indicated throughout the Contract Documents. The requirements of the Section are primarily related to performance of the Work beyond furnishing of manufactured products. The term "Quality Control" includes inspection, sampling and testing, and associated requirements.
- B. The Work shall be inspected and tested according to the requirements stated in the Drawings and Specifications.

1.2 SUBMITTALS

- A. Submit testing results in accordance with Section 01 33 00 – Submittal Procedures.
- B. For Engineer and Owner approval, the Contractor shall submit testing laboratory's qualifications and certifications prior to entering into a contractual agreement to perform quality control testing and inspection work.
- C. Reports of testing will be submitted to the Engineer indicating observations and results in test and indicating compliance or non-compliance with Contract Documents. It is the responsibility of the Contractor to ensure these submittals are provided in a timely manner to reduce cost impact of potential removal of defective work.

1.3 SAMPLING AND TESTING

- A. When not otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current ASTM standards, as applicable to the class and nature of the article or materials considered; however, the Owner reserves the right to use any generally-accepted system of inspection which, in the opinion of the Engineer will ensure the Owner that the quality of the workmanship is in full accord with the specifications.
- B. Any waiver of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial work, shall not be construed as a waiver of any technical or qualitative requirements of the specifications.
- C. Notwithstanding the existence of such waiver, the Engineer shall reserve the right to make independent investigations and tests as specified in Subparagraph 1.3.D, following; and, upon failure of any portion of the Work to meet any of the qualitative requirements of the specifications, shall be reasonable cause for the Engineer to require the removal or correction and reconstruction of any such work.

- D. In addition to any other inspection or quality assurance provisions that may be specified, the Engineer shall have the right to independently select, test, and analyze, at the expense of the Owner, additional test specimens of any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests or analyses made by the Contractor to determine compliance with the applicable specifications for the materials so tested or analyzed; provided, that wherever any portion of the work is discovered, as a result of such independent testing or investigation by the Engineer, which fails to meet the requirements of the specifications, all cost of such independent inspection and investigation, and all costs of removal, corrections, and reconstruction or repair of any such work shall be borne by the Contractor.

1.4 TESTING SERVICES

- A. The Owner shall hire an independent testing lab to perform quality control tests as specified in each specification. All tests shall be paid for by the Owner. The Contractor shall be responsible for scheduling the independent testing lab in advanced of any work being performed.

Item	Reference for testing requirements
Earthwork	See Section 31 00 00 – Earthwork
Trench Backfill	See Section 31 23 33 – Trenching and Backfilling
Asphalt Pavement	See Section 32 12 16 – Asphalt Paving
Cast-in-Place Concrete	See Section 03 30 00 – Cast-in-Place-Concrete
Masonry	See Section 04 22 00 – Concrete Unit Masonry
Grout	See Section 03 30 00 – Cast-in-Place-Concrete and Section 04 22 00 – Concrete Unit Masonry, as applicable
Structural Steel	See Section 05 12 00 – Structural Steel Framing
Roofing	See Section 07 50 00 - Roofing

- B. Testing company shall meet the following qualifications:
1. Basic requirements of ASTM E329, “Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials as Used in Construction” and ASTM D3666, “Standard Specification for Minimum Requirements for Agency Testing and Inspecting Bituminous Paving Materials”, as applicable.
 2. Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants.
- C. The Contractor shall notify Engineer 24 hour prior to the expected time for operations requiring inspection and laboratory test services. Failure of the Contractor to notify the Engineer at least 24 hours in advance of any such inspections shall be reasonable cause for the Engineer to order a sufficient delay in the Contractor's schedule to allow time for such inspections and any remedial or corrective work required, and all costs of such delays, including its effect upon other portions of the Work, shall be borne by the Contractor.

Samples and test specimens required under these specifications shall be furnished and prepared for testing in ample time for the completion of the necessary tests and analysis before said articles or materials are to be used. The Contractor shall furnish and prepare all required test specimens at their own expense.

- D. Should any tests fail the specified requirements, the work shall be redone and retested at the Contractor's expense.

1.5 REGULATORY REQUIREMENTS

A. General

1. Comply with all Federal, State, and local Codes as referenced herein. Such regulations apply to activities including, but not limited to, sitework and zoning, building practices and quality, on and offsite disposal, safety, sanitation, nuisance, and environmental quality.
2. Contractor designed structural systems are subject to the same overall inspection requirements as all other work.

B. Special Inspection

1. Special Inspection is in addition to, but not replacing, other inspections and quality control requirements herein.
2. Contractor will contract with and pay for the services of an independent Special Inspection Agency. Contractor shall coordinate with the designated Special Inspector to schedule the timing of site visits to perform the inspections in a timely manner.
3. A schedule of required Special Inspections is provided in the Contract Drawings.

C. Structural Observation

1. Inspect framework, shoring, pipe supports, and other Contractor-designed systems for adequacy.
2. Engineer will provide structural observation in addition to the inspection performed by the Special Inspection Agency.

1.6 RIGHT OF REJECTION

- A. The Engineer may reject portions of the Work not conforming to Contract Documents.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Inspection: The Contractor shall inspect materials or equipment upon their arrival on the job site and immediately prior to installation and reject damaged and defective items.
- B. Measurements: The Contractor shall verify measurements and dimensions of the work as an integral step of starting each installation.
- C. Manufacturer's Instructions: Where installation includes manufactured products, the Contractor shall comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in Contract Documents.

3.2 SITE INVESTIGATION AND CONTROL

Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the Work due to their failure to comply with this requirement.

Contractor shall inspect related and appurtenant work and shall report in writing to the Engineer any conditions which will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair or replacement caused by unsuitable conditions shall be performed by the Contractor at their sole cost and expense.

END OF SECTION 01 45 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall be responsible to provide all temporary facilities, utilities, controls, and services necessary to preform construction of the New Administration Building, Storage Building, Existing Administration Building improvements, and associated site improvements as per requirements of the Drawings and Specifications.

1.2 SAFETY

- A. The Contractor shall comply with all applicable Oregon OSHA regulations.
- B. Appropriate first aid facilities and supplies shall be kept and maintained by the Contractor at the site of the work. All persons within the construction area shall be required to wear protective helmets and eye protection. In addition, all employees of the Contractor and their subcontractors shall be provided with, and required to use, personal protective and life saving equipment as set forth in "Subpart E" of the OSHA Safety and Health Standards for Construction (29CFR 1926) including all of its amendments.
- C. During the performance of the Work, the Contractor shall erect and maintain temporary railings and barriers and shall take all other necessary precautions and place proper guards for the prevention of accidents and the Contractor shall erect and maintain suitable and sufficient lights and other signals.

1.3 TEMPORARY UTILITIES

- A. Types: The types of utility services required for general temporary use at the Site include the following:
 - 1. Water service (potable for certain uses, including fire protection)
 - 2. Storm sewer
 - 3. Sanitary sewer
 - 4. Electric power service
- B. Scheduled Uses: The Contractor shall, in conjunction with establishment of job progress schedule, establish a schedule for implementation and termination of service for each temporary utility at the earliest feasible time, and when acceptable to Owner and Engineer, change over from use of temporary utility service to permanent service.

1.4 TEMPORARY FACILITIES

- A. Contractor shall obtain all necessary permits, arrange for connection of utilities, and pay all required fees and utility costs associated with the work site during the construction activities.

- B. Suitable areas for on-site materials storage shall be maintained by Contractor as specified in Section 01 14 13 – Access to Site. Locations of storage areas shall be subject to Owner’s approval, but shall remain the responsibility of the Contractor. Location shall not interfere with drainage, traffic, or private property.
- C. Contractor shall set up and maintain in a neat and orderly manner all temporary construction facilities. Locations shall be subject to Owner’s approval but shall remain the responsibility of the Contractor.

1.5 CULTURAL RESOURCES

- A. The Contractor’s attention is directed to the National Historic Preservation Act of 1966 (16 U.S.C. 470) and 36 CFR 800 which provides for the preservation of potential historical architectural, archaeological, or cultural resources (hereinafter called cultural resources.).
- B. The Contractor shall conform to the applicable requirements of the National Historic Preservation Act of 1966 as it relates to the preservation of cultural resources.
- C. In the event potential cultural resources are discovered during subsurface excavations at the site of construction, the following procedures shall be instituted:
 - 1. The Engineer will issue a Field Order directing the Contractor to cease all construction operations at the location of such potential cultural resources find.
 - 2. Such Field Order shall be effective until such time as a qualified archaeologist can be called to assess the value of these potential cultural resources and make recommendations to the Engineer.

1.6 DUST ABATEMENT

- A. The Contractor shall prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to WWTRRF staff and persons occupying adjacent properties. The Contractor shall be responsible for any damage resulting from dust originating from its operations. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer.

1.7 RUBBISH CONTROL

- A. During the progress of the Work, the Contractor shall keep the Site and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Site, and shall establish regular intervals of collection and disposal of such materials and waste. The Contractor shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the Site in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.8 CHEMICALS

- A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer. In addition, see the requirements set forth in Section 01 57 23 – Temporary Stormwater Pollution Control.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The Contractor shall provide either new or used materials and equipment, which are in substantially undamaged condition and without significant deterioration and which are recognized in the construction industry, by compliance with appropriate standards, as being suitable for intended use in each case. Where a portion of temporary utility is provided by utility company, the Contractor shall provide the remaining portion with matching and compatible materials and equipment and shall comply with recommendations of utility company.

PART 3 - EXECUTION

3.1 INSTALLATION OF TEMPORARY UTILITY SERVICES

- A. Wherever feasible, the Contractor shall engage the utility company to install temporary service to project, or as a minimum, to make connection to existing utility service; locate services where they will not interfere with total project construction Work, including installation of permanent utility services; and maintain temporary services as installed for required period of use; and relocate, modify or extend as necessary from time to time during that period as required to accommodate total project construction Work.
- B. Temporary connections for electricity shall be subject to approval of the Engineer and the power company representative, and shall be removed in like manner at the Contractor's expense prior to final acceptance of the Work.
- C. Separation of Circuits: Unless otherwise permitted by the Engineer, circuits used for power purposes shall be separate from lighting circuits.
- D. Construction Wiring: Wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. Electrical facilities shall conform to the requirements of Subpart K of the OSHA Safety and Health Standards for Construction.

3.2 INSTALLATION OF POWER DISTRIBUTION SYSTEM

- A. Power: The Contractor shall provide power required for its operations under the Contract, and shall provide and maintain all temporary power lines required to perform the Work in a safe and satisfactory manner.
- B. Temporary Power Distribution: The Contractor shall provide a weatherproof, grounded, temporary power distribution system sufficient for performance of entire Work of project, including temporary electrical heating where indicated, operation of test equipment and test operation of building equipment and systems which cannot be delayed until permanent power connections are operable, temporary operation of other temporary facilities, including permanent equipment and systems which must be placed in operation prior to use of permanent power connections (pumps, HVAC equipment, and similar equipment), and power for temporary operation of existing facilities (if any) at the Site during change-over to new permanent power system.
 - 1. Provide circuits of adequate size and proper power characteristics for each use;
 - 2. Run circuit wiring generally overhead, and rise vertically in locations where It will be least exposed to possible damage from construction operations and will result in minimal interference with performance of the Work;
 - 3. Provide rigid steel conduit or equivalent raceways for wiring which must be exposed on grade, floors, decks, or other exposures to damage or abuse.

3.3 WATER SUPPLY

- A. The Contractor shall coordinate with the Utility they are obtaining water service connection from. The Contractor shall provide all facilities necessary to convey the water from the source to the points of use in accordance with the requirements of the Contract Documents; this includes back flow prevention in accordance with the utility's requirements.
- B. The Contractor shall provide and operate all pumping facilities, pipelines, valves, hydrants, storage tanks, and all other equipment necessary for the adequate development and operation of the water supply system. Water used for domestic purposes shall be free of contamination and shall conform to the requirements of the State and local authorities for potable water. The Contractor shall be solely responsible for the adequate functioning of its water supply system and shall be solely liable for any claims arising from the use of same, including discharge or waste of water there from.
- C. The Contractor shall not make connection to or draw water from any fire hydrant or pipeline without first obtaining permission of the Owner. For each such connection made, the Contractor shall first attach to the fire hydrant or pipeline a valve, meter, and backflow prevention device acceptable to the Owner.

3.4 STORM WATER

- A. All storm water runoff and control of soil erosion shall be managed as outlined in Specification Section 01 57 23 – Temporary Stormwater Pollution Control and as complies with Oregon DEQ requirements.

3.5 INSTALLATION OF SANITARY FACILITIES

- A. Fixed or portable chemical toilets shall be provided wherever needed for the use of Contractor's employees. Toilets at construction job sites shall conform to the requirements of Subpart C Section 1926.51 of the OSHA Standards for Construction.
- B. The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the Site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto.
- C. The Contractor shall coordinate with the Owner for obtaining sewer connection and shall pay all permit and sewer usage charges. The sewer capacity charges will be paid by the Owner.

3.6 INSTALLATION OF COMMUNICATIONS

- A. Telephone Services: The Contractor shall provide and maintain at all times during the progress of the Work not less than one telephone in good working order at its own field construction office at or near the Site.
- B. Telephone Use: The Contractor shall permit the Engineer, the Owner, or their authorized representatives or employees free and unlimited use of said telephone facilities for all calls.

3.7 OPERATIONS AND TERMINATIONS

- A. Prior to placing temporary utility services into use, the Contractor shall inspect and test each service and arrange for governing authorities' required inspection and tests, and obtain required certifications and permits for use thereof.
- B. The Contractor shall maintain distinct markers for underground lines, and protect from damage during excavating operations.
- C. When need for a temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than time of substantial completion, the Contractor shall promptly remove installation unless requested by Engineer to retain it for a longer period. The Contractor shall complete and restore Work which may have been delayed or affected by installation and use of temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces.
- D. Before final acceptance of the Work on the project, all temporary connections and piping installed by the Contractor shall be entirely removed, and all affected improvements shall be restored to original condition or better, to the satisfaction of the Engineer and to the Owner.

END OF SECTION 01 50 00

SECTION 01 52 13 - ENGINEER'S FIELD OFFICE

PART 1 - GENERAL

1.1 RESIDENT ENGINEER'S OFFICE

- A. Contractor shall provide the Owner's Resident Engineer with a temporary office at the site of the Work, at a location agreeable to the Engineer and separate from the Contractor's office. The office shall be provided within two weeks of written Notice to Proceed and shall be subject to approval by the Engineer. The Contractor's attention is directed to the condition that no payment for mobilization, or any part thereof, will be approved for payment under the contract until all field office facilities specified herein, have been provided.
- B. Unless released earlier by the Engineer in writing, the field office shall be maintained in full operations at the site with all utilities connected and operable until final Notice of Completion has been executed and recorded. Upon recordation of final Notice of Completion, or upon early release of the field office by the Engineer, the Contractor shall remove the field office within 10 working days from said site, and shall restore the site occupied by field office to the original condition or better.
- C. The door to the office shall be equipped with a satisfactory lock, and all keys (four required) in connection therewith shall be turned over to the Resident Engineer. All facilities and equipment provided under this Section shall remain the property of the Contractor.

1.2 OFFICE FACILITIES

- A. Contractor shall provide and maintain for the exclusive use of the Engineer and the Owner's representative and personnel, at a point convenient to the construction operations, one separate, well-lighted, air-conditioned, electrically-heated field office with an outdoor outhouse. The office shall be located close to the Contractor's field office. Said office shall be of the portable trailer type unless otherwise specifically authorized by the Engineer in writing, and shall be a separate unit not attached or connected to any other structures.
- B. Said office shall have a floor area of at least 240 square feet and shall be provided with at least 4 windows, electric lights, four 120-volt receptacles, heater, air-conditioning, bottled drinking water with chilled water dispenser, outdoor toilet, and internet on a separate circuit from the Contractor's. The internet hook-up/installation charge shall be borne by the Contractor; however, the Engineer's monthly bills will be paid by the Owner. The electrical installation charge and monthly electric bills shall be paid by the Contractor.
- C. Contractor shall furnish and install all necessary electrical wiring, sanitary facilities, air conditioning and heating equipment, and shelving, and shall furnish all necessary light, heat, water, and janitorial services in connection with the field office specified herein, for the duration of the Work.

- D. Contractor shall provide a meeting room as either a part of the Contractor's office or as a separate trailer. The room shall have a table and adequate space for 10 chairs around the table. The room shall be well lit, air conditioned, and electrically heated.

1.3 FIELD OFFICE SERVICES

- A. Field office required hereunder shall be provided with sufficient lighting to provide not less than 50-foot candles at desktop height at each desk location. Exterior lighting shall be provided over the entrance door.
- B. A minimum of four 110-volt a-c duplex electric convenience outlets shall be provided, with at least one such outlet on each wall. The electric distribution panel shall provide not less than 2 circuits providing 110-volt, 60-Hertz service.
- C. Refrigerated, bottled water service and a continuous supply of paper cups shall be provided for the field office.
- D. A chemical toilet with an approved holding tank shall be provided. All such sanitary waste material shall be regularly pumped out and the chemicals recharged. Contractor shall provide and maintain a continuous supply of toilet paper and paper towels with holders.
- E. Regular janitorial services shall be provided during working hours on a weekly basis. Office shall be swept, dusted, and waste receptacles emptied.

PART 2 - PRODUCTS

2.1 FIELD OFFICE EQUIPMENT

- A. Contractor shall provide the following listed items in good condition for the field office:
 - 1. 1 each Standard 30x60 inch desk(s) with not less than 3 drawers.
 - 2. 1 each Drafting table 36 x 17 inch top; 36" high, with drafting stool.
 - 3. 2 each Metal file cabinet, 4-5 drawer with lock and keys.
 - 4. 1 each 30-inch x 8-foot reference table.
 - 5. 2 each Office chair(s) standard arm rest type, adjustable, swivel, tilt-back with casters.
 - 6. 4 each Side chairs
 - 7. 2 each Wastebaskets

8. 1 each Refrigerated-type bottled water dispenser unit and bottled water and paper cup supply.
9. 1 each Fire extinguisher
10. Provide either cable or wireless internet (no dial up)
11. 1 each Printer/copier/scanner
12. 1 each 4 port hub for multiple connections

PART 3 - EXECUTION NOT USED

END OF SECTION 01 52 13



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SECTION 01 57 23 - TEMPORARY STORMWATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Construction activities that disturb one acre or more are regulated under the National Pollutant Discharge Elimination System (NPDES) Regulations for Storm Water Discharges.
- B. The work under this Contract is not anticipated to disturb one acre or more, and therefore a formal Stormwater Pollution Prevention Plan (SWPPP) and coverage under the Oregon DEQ 1200-C Construction Stormwater General Permit are not required.
- C. Construction activities shall include best management practices that prevent and control soil erosion, transport, sedimentation, and further water and air pollution that may degrade receiving waters including rivers, streams, lakes, reservoirs, groundwater and wetlands. The control measures contained herein shall be installed and maintained through the construction contract and coordinated with any permanent or temporary pollution control feature specified elsewhere on the plans and in the specifications to assure effective and continuous water pollution control throughout the construction and post construction periods. The controls may include silt fences, straw wattles, rock berms, diversion dikes, interceptor swales, sodding, mulching, soil retention blankets, or other structural or non-structural stormwater pollution controls. Any and all erosion control structures and stabilization practices will be inspected, maintained by the Contractor on a weekly basis, and after any storm event of 0.25 inches or greater.
- D. The Contractor shall implement temporary erosion control, sediment control, and stormwater protection measures as necessary to prevent construction-related pollutants from leaving the site. The Owner reserves the right to have required temporary erosion sedimentation and water pollution prevention and control work performed by others should the CONTRACTOR fail to perform required temporary erosion, sedimentation, and water pollution prevention and control work in a timely fashion or should the Contractor fail to prevent and control soil erosion, sedimentation, and water pollution which may degrade receiving water. All costs, including engineering, for the work required shall be borne by the Contractor.

1.2 REFERENCES

- A. The Oregon Department of Environmental Quality:
 - 1. Catalog of Stormwater Best Management Practices for Oregon Cities and Counties: <https://www.oregon.gov/deq/wq/Documents/wqpBMPManual.pdf>

PART 2 - PRODUCTS

2.1 ESC

- A. The Contractor will be furnished a draft erosion and sediment control drawing(s) by the Engineer.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall protect stormwater quality during construction activities that disturb soils or have the potential to impact stormwater quality.
- B. A copy of the ESC and approved plans shall be kept on site at all times.

3.2 MAINTENANCE & INSPECTION PROCEDURES

- A. Any and all erosion control structures and stabilization practices will be inspected by the Contractor on a weekly basis at a minimum and after any storm event of 0.25 inches or greater. During the winter when the ground is frozen and runoff is unlikely to occur, such inspections shall be conducted at least every two weeks.
 - 1. All areas that undergo temporary and final stabilization with seeding or sodding shall be inspected; areas that have lack of growth and bare spots shall be reseeded by the Contractor to ensure healthy growth.
 - 2. All erosion control structures and stabilization practices shall be maintained in good working condition throughout the duration of the construction project.
 - 3. Repair of the damage to any structural erosion control structure shall be completed by the Contractor within 24 hours of discovery of the damage.
 - 4. In locations where silt fences or wattles are used around catch basins, trapped sediment shall be removed by the Contractor when one-third of the height of the silt fence or wattle is covered by sediment.
 - 5. Hard surfaces shall be swept at the end of each day's work.

3.3 CLEAN UP AND REMOVAL OF BMPS

- A. After final stabilization, remove all temporary BMPs and dispose of off-site at no cost to the Owner.
- B. After removal of temporary BMPs, sweep all sediment accumulated on project hard surfaces, including asphalt, sidewalks, and adjacent roadways.

END OF SECTION 01 57 23

SECTION 01 58 13 - TEMPORARY PROJECT SIGNAGE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish and install temporary signs identifying the project, funding agencies, and design firms as specified herein.
- B. The Contractor may furnish and install temporary sign identifying Contractor and Sub-Contractor businesses as specified herein.

1.2 SUBMITTALS

- A. Shop Drawings: The Contractor shall provide shop drawings of all signs in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Shop Drawing shall consist of full-size layouts of all signs. Details of installation shall be submitted showing support system, location, and relative layout of signs.

1.3 REFERENCE STANDARDS

- A. Oregon DEQ & CW-SRF
 - 1. <https://www.oregon.gov/deq/wq/Documents/ProjectSign.pdf>

PART 2 - PRODUCTS

2.1 GENERAL

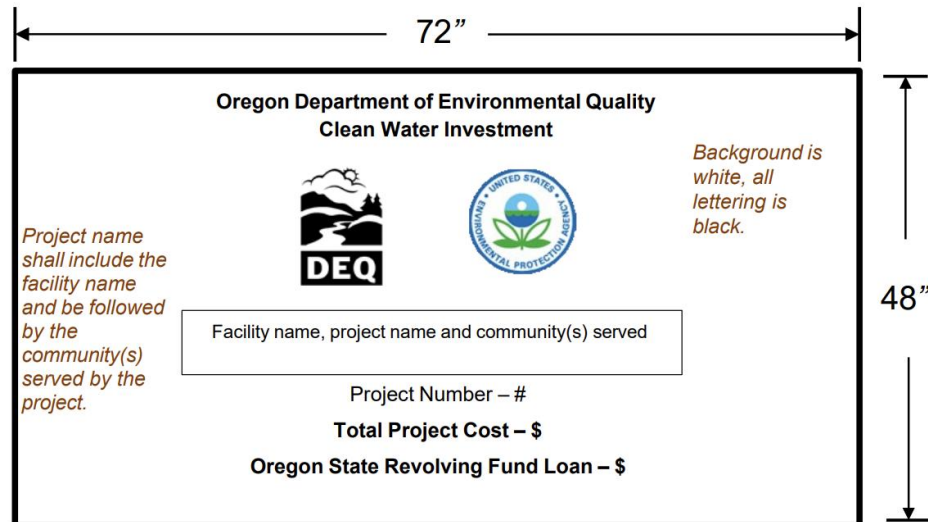
- A. A separate sign shall be provided for funding agencies (if required). Design firms and construction business signs may be combined in a single layout.
- B. Style and color of lettering and logos shall be as specified herein and of professional quality; all lettering will be in proportion to the sizes shown. All wording shall be as indicated and shall be verified and approved before fabrication.
- C. Materials shall be durable and weather resistant.
- D. Information specified on the attached details will be displayed on the sign.
- E. Any additional information displayed on the sign will not detract from or displace the information required in the drawing.

2.2 FUNDING AGENCY SIGN

- A. If required by funding agency, Contractor shall provide a sign constructed of 4.0 feet by 8.0 feet exterior type high-density overlaid plywood or other sign material of equivalent quality and durability.

2.3 PROJECT IDENTIFICATION SIGN

- A. Sign shall be constructed of 4.0 feet by 6.0 feet exterior type high-density overlaid plywood or other sign material of equivalent quality and durability. Layout as shown below:



- B. The Contractor shall submit artistic sketches and layout as shop drawing for review and approval before fabrication. The Owner's and Engineer's logos shall be incorporated into the design. At a minimum, the lettering on the sign shall include the following:

CITY OF PENDLETON

WWTRRF IMPROVEMENTS 2025

Design Engineer: Keller Associates, Inc.

- C. Sign layout shall be such that Project Identification is prominent and equal visual weight is given to Owner and Engineer logos.
- D. Inclusion of Contractor's logo is encouraged but not required, and shall meet the following requirements:
- Visual weight for Contractor's logo shall not exceed that of Owner or Engineer. (Space allotted for Contractor's logo and lettering shall not exceed (by area) space allotted for Owner or Engineer.)
 - If Contractor logo's are to be included then there shall be space reserved of equal size for Contractors performing other work on the West Clarifier and Process Building improvements bid packages.
 - A limited number of Sub-Contractor's logo(s) may also be incorporated, subject to Owner and Engineer approval, the sum of which shall not exceed (by area) the space allotted for Contractor's logo and/or lettering.

2.4 CONTRACTOR IDENTIFICATION SIGN

- A. A third sign may be allowed for identification of Contractor and a limited number of Sub-Contractor's logo(s), subject to Owner and Engineer approval. The Contractor shall submit artistic sketches and layout as shop drawing for review and approval before fabrication.
- B. Sign shall be constructed of exterior type high-density overlaid plywood or other sign material of equivalent quality and durability, no bigger than half the size of the Project Identification Sign.

PART 3 - EXECUTION

3.1 GENERAL

- A. Signs shall be installed prior to commencement of construction at a location which is near the project site and amenable to public viewing.
- B. Signs shall be displayed continuously throughout project construction. Vandalized and/or damaged signs shall be repaired or replaced immediately, and meet the same specifications as the original sign.
- C. The signs will be removed and appropriately disposed of when the construction is complete and accepted by Owner and funding agency(s).

3.2 INSTALLATION

- A. Signs shall be located near the main construction access to the project and be visible from the main public access corridor to the site.
- B. Signs and supports shall not impede access to or from site.
- C. Fasten signs securely in level and plumb positions.
- D. The sign will be adequately supported with regard to site conditions and will be an adequate distance above the prevailing grade to permit public viewing.

END OF SECTION 01 58 13



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SECTION 01 71 13 - MOBILIZATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Mobilization consists of preparatory work and operations including, but not limited to those necessary for the movement of personnel, movement of equipment, temporary construction facilities, supplies and incidentals to the project site. Included is the establishment of all necessary offices, buildings, signs, utilities, acquisition of permits, preconstruction submittals, and all other work which must be performed and costs incurred prior to beginning work on the various items of the contract.
- B. Mobilization shall include the following principal items:
 - 1. Moving onto the site all Contractor's plant and equipment required for first month operations.
 - 2. Providing all necessary temporary on-site utilities per Section 01 50 00 – Temporary Facilities and Controls.
 - 3. Arranging for and erection of Contractor's work and storage yard in accordance with Section 01 14 13 – Access to Site.
 - 4. Arranging for and erection of Resident Engineer's field office in accordance with Section 01 52 13 – Engineer's Field Office.
 - 5. Constructing and implementing security features and requirements complying with Section 01 35 53 – Security Procedures.
 - 6. Installing proper stormwater pollution prevention measures in accordance with Section 01 57 23 – Temporary Stormwater Pollution Control.
 - 7. Obtaining all required permits and property insurance.
 - 8. Having all Oregon OSHA required notices and establishment of safety programs.
 - 9. Having the Contractor's superintendent at the job site full-time during active construction.
 - 10. Installing the Project Sign in accordance with Section 01 58 13 – Temporary Project Signage.
 - 11. Submitting pre-construction submittals in accordance with Specification Section 01 33 00 - Submittal Procedures.
 - 12. Coordinating construction activities within an active WWTRRF to prevent operational disruption.

1.2 SITE AREA

- A. The limits of the project site are as indicated on the Drawings.
- B. Contractor shall provide and maintain all signing, barricades, fencing, drainage facilities, and other items as required to protect public and private property from damage caused by mobilization operations.

1.3 ACCESS

- A. Refer to Section 01 14 13 – Access to Site.
- B. If construction access is required in addition to that shown on the Drawings, Contractor shall secure Owner's approval of all additional project entrances prior to construction. Contractor shall also obtain written approval from impacted land owner(s) if other than project owner.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.1 PAYMENT FOR MOBILIZATION

- A. Allowable amounts for partial payment of mobilization are as follows:
 - 1. First monthly progress estimate: Up to 60% of the Mobilization contract price in the agreed-upon Schedule of Values, or 6% of the total Contract Amount, whichever is less.
 - 2. The balance of the Mobilization contract price in the agreed-upon Schedule of Values shall be paid after Substantial Completion.
 - 3. The Contractor's attention is directed to the condition that 2 percent of the total Contract Price will be deducted from any money due the Contractor as progress payments until all mobilization items listed above have been completed as specified. The aforementioned amount will be retained by the Owner as the agreed estimated value of completing all of the mobilization items listed. Any such retention of money for failure to complete all such mobilization items as a lump-sum item shall be in addition to the retention of any payments due to the Contractor as specified in Division 00 of Specifications..

END OF SECTION 01 71 13

SECTION 01 71 23.16 - CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor shall provide construction surveying for the project.
- B. The Contractor shall hire a professional land surveyor to reset any disturbed survey monuments in accordance with Oregon Code.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.1 GENERAL

- A. The electronic AutoCAD base maps used to create the drawings are available to the Contractor. In the event of a discrepancy between the stamped paper drawings and the electronic files, the stamped paper drawings shall govern. The Contractor shall immediately notify the Engineer of any discrepancies prior to proceeding. The Contractor shall indemnify and hold harmless the Owner and Engineer from all liability, claims, damages, losses and expenses, including attorneys' fees arising out of or resulting from the Contractor's use or interpretation of electronic files.

3.2 CONSTRUCTION STAKING

- A. The Contractor shall provide location and grade construction surveying as required to locate the Work. Survey control shall be sufficient to ensure conformance with the Contract Documents. Contractor shall verify all dimensions and elevations prior to construction. Any discrepancies shall be reported to the Engineer before proceeding.

3.3 MONUMENTATION

- A. The Contractor shall employ a professional land surveyor, duly and properly registered in the State of Oregon, to reference all public and private land survey monuments that will be disturbed by construction activities prior to construction. Reestablish such monuments as part of the survey work for this project before project completion in accordance with Oregon Code. Section corner and quarter corner monuments reset after construction shall include corner perpetuations and filing with the county. Sixteenth corner monuments reset and having existing corner perpetuation filed with the county shall have new perpetuation records filed after the corner has been reset. Perform all monument work in accordance with Oregon State Code. Perform all corner, property, and roadway centerline reestablishment in accordance with standard surveying practices under the responsible charge of a professional land surveyor.

END OF SECTION 01 71 23.16



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SECTION 01 71 33 - PROTECTION OF ADJACENT CONSTRUCTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements indicated on the drawings and to see that such utilities or other improvements are adequately protected from damage due to all construction operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be directed by the Owner.

1.2 RIGHTS-OF-WAY

- A. The Contractor shall not do any work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure; nor shall the Contractor enter upon the rights-of-way involved until notified that the Owner has secured authority from the property owner.

1.3 EXISTING UTILITIES AND IMPROVEMENTS

- A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities, including underground utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements specified herein, and in accordance with the requirements of the Contract Documents.
- B. The Contractor shall determine the exact locations and depths of all underground utilities indicated on the drawings.
- C. The right is reserved to the Owner and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this contract.
- D. Existing utility lines that are shown on the drawings or the locations of which are made known to the Contractor prior to excavation and that are to be retained, and all utility lines that are constructed during excavation operations, shall be protected from damage during excavation and back-filling and, if damaged, shall be immediately repaired by the Contractor at their expense.
- E. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Owner a sufficient time in advance for the necessary measures to be taken to prevent interruption of the service.
- F. All repairs to a damaged improvement shall be inspected and approved by an authorized representative of the improvement owner before being concealed by backfill or other work.

- G. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is shown on the drawings, the Contractor shall, at their own expense, remove and without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the Owner of the facility. In all cases of such temporary removal or relocations, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.1 NOTIFICATION BY THE CONTRACTOR

- A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

END OF SECTION 01 71 33

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Comply with requirements stated in conditions of the contract and in Specifications for administrative procedures in closing out the Work.
- B. Furnish lien waivers, bond extensions, and other required data.
- C. Satisfy conditions of the contract, fiscal provisions, legal submittals and additional administrative requirements.

1.2 SUBSTANTIAL COMPLETION

- A. When substantially complete, the Contractor shall submit to the Owner:
 - 1. A written notice that the Work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, Engineer will perform a site visit to check the status of completion. If the Work is not deemed substantially complete, the following will occur:
 - 1. Owner will promptly notify the Contractor in writing, giving the reasons, therefore.
 - 2. The Contractor shall remedy the deficiencies in the Work, and send a second written notice of Substantial Completion to the Owner.
 - 3. Owner will request the Engineer to re-check the Work.
 - 4. Once the Work is deemed substantially complete and after review and approval, the Engineer will execute and deliver to the Owner and the Contractor, the Certificate of Substantial Completion with a final list of items to be completed or corrected prior to release of final payment.

1.3 PROJECT RECORD DOCUMENTS

- A. Maintain at Project site, available to Owner and Engineer, one copy of the Contract Documents, shop drawings and other submittals, in good order.
 - 1. Mark and record field changes and detailed information contained in submittals and change orders.
 - 2. Record actual depths, horizontal and vertical location of underground pipes, duct banks and other buried utilities. Reference dimensions to permanent surface features.

3. Identify specific details of pipe connections, location of existing buried features located during excavation, and the final locations of piping, equipment, electrical conduits, manholes, and pull boxes.
 4. Identify location of spare conduits including beginning, ending, and routing through pull boxes and manholes. Record spare conductors, including number and size, within spare conduits, and filled conduits.
 5. Provide schedules, lists, layout drawings, and wiring diagrams. Project photos to be provided to Owner at completion of project.
 6. Make annotations with erasable colored pencil conforming to the following color code:
 - a. Additions - Red
 - b. Deletions - Green
 - c. Comments - Blue
 - d. Dimensions - Graphite
 7. Make all annotations on one set of drawings.
- B. Maintain documents separate from those used for construction.
1. Label documents "RECORD DRAWINGS."
- C. Keep documents current.
1. Record required information at the time the material and equipment is installed and before permanently concealing.
 2. During progress meetings, record documents will be reviewed to ascertain that changes have been recorded.
- D. Submit record documents for review. Submittal shall be in accordance with Section 01 33 00 – Submittal Procedures.

1.4 FINAL SUBMITTALS

- A. The Contractor, prior to requesting final payment, shall obtain and submit the following items to the Engineer for transmittal to the Owner:
1. Written guarantees, where required.
 2. Technical Manuals and instructions.
 3. New permanent cylinders and key blanks for all locks.
 4. Maintenance stock items; spare parts; special tools.

5. Completed record drawings.
 6. Bonds for roofing, maintenance, etc., as required.
 7. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
 8. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.
 9. Letter from bonding company stating that bonds will be extended for one year after substantial completion.
- B. Owner will prepare a final Change Order, reflecting approved adjustments to the contract sum which were not previously made by Change Orders.

1.5 FINAL CLEANUP

- A. The Contractor shall promptly remove from the vicinity of the completed Work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily performed the final cleanup of the Site.

1.6 MAINTENANCE AND GUARANTEE

- A. The Contractor shall comply with the maintenance and guarantee requirements contained in the Contract Drawings and Specifications.
- B. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly, the Owner reserves the right to do the Work and the Contractor and its surety shall be liable to the Owner for the cost thereof.

1.7 FINAL PAY ESTIMATE

- A. Submit final pay estimate and supporting data to Owner.
- B. Final estimates shall reflect all adjustments to the contract sum:
1. The original contract sum
 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Allowances
 - c. Unit prices
 - d. Deductions for uncorrected work

- e. Penalties and bonuses
- f. Deductions for liquidated damages
- 3. Total contract sum, as adjusted
- 4. Previous payments
- 5. Sum remaining due

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall submit technical operation and maintenance information for each item of mechanical and electrical equipment in an organized manner in the Owner's Manual. It shall be written so that it can be used and understood by the Owner's operation and maintenance staff. The Owner's Manual information shall also be submitted in electronic format using a USB flash drive.
- B. All manuals supplied to the Owner by suppliers of Owner-furnished equipment, shall be inserted into the Owner's Manual by the Contractor. The Contractor shall be responsible for providing all other information.

1.2 OWNER'S MANUAL

- A. The Owner's Manual shall include the following for each item of mechanical and electrical equipment (as applicable):
 - 1. Equipment Summary: A summary table shall include the equipment name and equipment number, the manufacturer's model number, serial number, and other nameplate information specific to the equipment provided.
 - 2. Operational Procedures: Manufacturer-recommended procedures on the following shall be included:
 - a. Installation
 - b. Adjustment
 - c. Startup
 - d. Location of controls, special tools, equipment required, or related instrumentation needed for operation
 - e. Operation procedures
 - f. Load changes, Calibration, Shutdown
 - 3. Troubleshooting, Disassembly, Reassembly
 - a. Realignment
 - b. Testing to determine performance efficiency
 - c. Tabulation of proper settings for all pressure relief valves, low and high pressure switches, and other protection devices

- d. List of all electrical relay settings including alarm and contact settings
 - 4. Preventive Maintenance Procedures:
 - a. Procedures: Preventive maintenance procedures shall include all manufacturer-recommended procedures to be performed on a periodic basis, both by removing and replacing the equipment or component, and by leaving the equipment in place.
 - b. Schedules: Recommended frequency of preventive maintenance procedures shall be included. Lubrication schedules, including lubricant SAE grade, type, and temperature ranges, shall be covered.
 - 5. Parts List and Drawings:
 - a. Parts List: A complete parts list shall be furnished, including a generic description and manufacturer's identification number for each part. Addresses and telephone numbers of the nearest supplier and parts warehouse shall be included.
 - b. Drawings: Cross-sectional or exploded view drawings shall accompany the part list.
 - 6. Wiring Diagrams: Include complete internal and connection wiring diagrams for electrical equipment items.
 - 7. Shop Drawings: Include approved shop or fabrication drawings, complete with dimensions. Include performance curves for pumps furnished.
 - 8. Safety: This part describes the safety precautions to be taken when operating and maintaining the equipment or working near it.
 - 9. Documentation: All equipment warranties, affidavits, and certifications required by the Technical Specifications shall be placed in this part.
 - 10. Spare Parts: This part shall contain spare parts information for all mechanical, electrical, and instrumentation equipment. The spare parts list shall include the current list price of each spare part. The spare parts list shall be limited to those spare parts which each manufacturer recommends be maintained by the Owner in inventory at the plant site. Each manufacturer or supplier shall indicate the name, address, and telephone number of its nearest outlet of spare parts to facilitate the Owner in ordering. The Contractor shall cross-reference all spare parts lists to the equipment numbers designated in the Contract Documents.
- B. If manufacturer's standard brochures and manuals are used to describe operating and maintenance procedures, modify such brochures and manuals **to reflect only the model or series of equipment used on this project and features provided**. Cross out neatly or remove extraneous material or otherwise annotate or eliminate. Operation and Maintenance (O&M) information shall be organized and submitted in accordance with the Oregon DEQ O&M manual requirements/template. Manufacturer literature shall be incorporated into the DEQ format and shall not be submitted as standalone documents.

1.3 TRANSMITTAL PROCEDURE

- A. Provide three (3) original paper copies and one (1) electronic copy in PDF format of all operating and maintenance information. For ease of identification, label each manufacturer's brochure and manual with the equipment name. Organize the information in 3-ring binders and use an indexing feature within the PDF submission, in numerical order, per specification section number. Include in the manuals a table of contents and tab sheets to permit easy location of desired information. Each binder shall include a cover sheet and spine label giving the project name, Engineer's project number, DEQ loan number, Contractor name and contact information, applicable subcontractor name and contact information, and supplier name and contact information.
- B. The Contractor shall submit to the Engineer three identical Owner's Manuals a minimum of 90 calendar days prior to the scheduled startup of the equipment.
- C. The Engineer will review the Owner's Manuals within 30 days following their receipt by the Engineer. The Contractor shall then make any corrections and changes noted and compile all the corrected Owner's Manuals for final submittal to the Engineer.

1.4 PAYMENT

- A. Acceptable operating and maintenance information for the project must be delivered to the Engineer prior to the project being 75 percent complete or at least two weeks prior to startup of any equipment. Progress payments for work in excess of 80 percent completion or 2 weeks prior to startup will not be made until the specified acceptable operating and maintenance information has been delivered to the Engineer.

1.5 FIELD CHANGES

- A. Following the acceptable installation and operation of an equipment item, the item's instructions and procedures are to be modified and supplemented to reflect any field changes or information requiring field data.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 01 78 23



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SECTION 02 41 00 – DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTIONS

- A. Work under this Section includes providing selective demolition of part of the existing site features or facility shown on the drawing and as specified herein.
- B. Demolition work is considered incidental the project. Perform work as indicated in the Drawings and Specifications. Repairs to areas outside of these demolition limits, as determined by the Engineer, shall be replaced or reconstructed at no cost to the Owner.

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. In addition to federal requirements, comply with Oregon DEQ asbestos rules under OAR 340-248 for survey, notification, handling, and disposal.
- B. 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.
- C. 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
- D. 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.
- E. If ACM is found and was not previously identified in the Contract and is above the threshold quantity as defined in NESHAP 40 CFR 61.145 Standard for Demolition and Renovation, stop Work on the affected structure and notify the Owner and Engineer. Do not proceed with Work on the affected structure until a Change has been issued by the Owner.

3.3 EPA NOTIFICATION REQUIREMENTS

- A. Submit NESHAP demolition/renovation notifications consistent with federal requirements. In Oregon, DEQ notification requirements under OAR 340-248 apply and may supersede EPA requirements unless otherwise directed by at least 10 days prior to the

start of demolition/renovation operations, as outlined in NESHAP 40 CFR 61.145. Use the most current EPA Region 10 NESHAP form provided on EPA's website.

- 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 NESHAP notification to the EPA Region 10 ONLY IF required by the Engineer. Oregon DEQ notification requirements under OAR 340-248 remain applicable.

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 tools 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 02 41 00

SECTION 03 11 00 – CONCRETE FORMING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide complete formwork design and required calculations.
- B. Furnish all labor, materials, and equipment as required for forming cast-in-place concrete, including necessary shoring, bracing, and anchorage.
- C. Construct openings in formwork as required for other related work.
- D. Provide and install all form accessories such as snap ties, bracing, etc.
- E. Stripping of forms from finished concrete.

1.2 REFERENCE STANDARDS

- A. ACI 17 – Specifications for Tolerances for Concrete Construction and Materials
- B. ACI 301 – Specifications for Structural Concrete
- C. ACI 318 – Building Code Requirements for Structural Concrete and Commentary
- D. ACI 347R – Guide to Formwork for Concrete
- E. PS 1 – Structural Plywood

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Shop Drawings: Submit concrete forming plans stamped by a professional engineer registered in Oregon for review for all forming where the height of the concrete work exceeds four feet.
 - 1. Submit shoring and reshoring designs for all concrete work where shoring or reshoring is required.
 - 2. Design and provide forms for pressure resulting from placement of concrete and construction loads while maintaining the specified tolerances.
 - 3. Forming shall have sufficient strength to support loads, lateral pressure, and allowable stresses outlined in ACI 347R and for design considerations including wind load, temporary construction loads, and construction equipment loads.

- C. Calculations: Submit concrete form design calculations stamped by a professional engineer registered in Oregon

1.4 QUALITY ASSURANCE

- A. Designer's Qualifications: Professional engineer, licensed in State where Work is to be done and having experience in concrete formwork. The Contractor is responsible for the design and adequacy of formwork and shoring.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.
- C. Comply with applicable State and local codes with respect to design, fabrication, erection, and removal of formwork.
- D. Comply with ACI 347R, ACI 301, and ACI 318.

2.2 MATERIALS

- A. Smooth Forms: Pre-manufactured forms or job fabricated forms using plyform faced with material which will produce smooth, hard, uniform texture on concrete.
 - 1. Arrange facing materials orderly and symmetrical, keeping number of seams to a practical minimum.
 - 2. Do not use material with raised grain, patches, or other defects which will impair texture of concrete surfaces.
- B. Forming accessories:
 - 1. Use fabricated wire.
 - 2. Use form ties constructed so that ends or end fasteners can be removed without causing appreciable spalling of concrete faces.
 - 3. After ends or end fasteners of form ties have been removed, embedded portion of ties to terminate not less than two diameters from formed faces of concrete, but in no case less than 3/4-inch.
 - 4. When formed face of concrete is not to be permanently exposed to view, form ties may be cut off flush with formed surfaces.
 - 5. Use ties with 3/4-inch diameter cones and a 1-1/2-inch break back on both ends for water retaining structures. Ties are to be furnished with a water seal or stop.

6. Snap ties, if used, shall not be broken until the concrete has reached the design concrete strength. Snap ties, designed so that the ends must be broken off before the forms can be removed, shall not be used. The use of tie wires as form ties will not be permitted. Fully threaded stub bolts may be used in lieu of smooth ties with waterstops.
 7. Taper ties with plastic or rubber plugs of an approved and proven design may also be used. The plugs must be driven into the hole with a steel rod, placed in a cylindrical recess made for the plug. At no time shall plugs be driven on the flat area outside the cylindrical recess. Plugs shall be A58 Sure Plug as manufactured by Dayton Superior.
 8. Form ties which remain in the corewall of water-retaining structures shall have waterstops and a one-inch minimum breakback or cone depth.
- C. Fillets for Chamfered Corners: Wood or plastic strips attached to the inside of forms.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify lines, levels, and measurements before proceeding with formwork. Ensure dimensions agree with the Drawings.

3.2 CONSTRUCTION

- A. Make forms sufficiently tight to prevent loss of cement paste.
- B. Place chamfer strips in corners of forms to produce beveled edges on permanently exposed surfaces.
 1. Interior corners on such surfaces and edges of formed joints will not require beveling.
- C. To maintain specified finish tolerances, chamfer formwork to compensate for anticipated deflections.
- D. Provide positive means of adjustment using wedges or jacks, or shores and struts, and take up all settlement during concrete placing operation.
- E. Securely brace forms against lateral deflection.
- F. Provide temporary ports in formwork to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close ports with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.
- G. At construction joints, overlap forms over hardened concrete at least 6 inches. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain true surface.

- H. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing steel.
- I. Anchor formwork to shores or other supporting surfaces or members so that upward or lateral movement of any part of formwork system is prevented during concrete placement.
- J. The wall form design shall be such that wall sections can be poured full height without creating horizontal cold joints and without causing snapping of form ties which shall be of sufficient strength and number to prevent spreading of the forms during placement of concrete and which shall permit ready removal of the forms without spalling or damaging the concrete.

3.3 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for Work embedded in or passing through concrete.
- B. Coordinate Work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- C. Install accessories in accordance with manufacturer's instructions, level and plumb with templates where necessary. Ensure items are not disturbed during concrete placement.
- D. Position embedded items accurately and support against displacement.

3.4 FORM FINISHES

- A. Use smooth forms for natural plywood, grout cleaned, smooth rubbed, scrubbed, or sand floated finishes.
 - 1. Fabricate true-to-line in order that surfaces produced will require little dressing to arrive at true surfaces.
 - 2. Where an as-cast finish is required, no dressing shall be permitted in the finishing operation.
- B. Install form panels in orderly arrangement with joints planned in approved relation to building elements.

3.5 FORM COATING

- A. Unless otherwise specified or approved, treat surfaces of forms.
- B. Cover surfaces of forms with form coating to aid in removal of forms with minimal damage to concrete.

3.6 REMOVAL OF FORMS

- A. Formwork for piers, walls, sides of beams, and other parts not supporting weight of concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal.

- B. When shores and other vertical supports are so arranged that non-load carrying, form-facing material may be removed without loosening or disturbing shores and supports, facing material may be removed at an earlier age as permitted. Forms may not be removed prior to 24 hours after placement of concrete.
- C. Shore exterior stem walls of Storage Building taller than 3'-0" until the interior slab on grade is completely in place and has reached 75% of its design strength.

3.7 REUSE OF FORMS

- A. Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of surface.
- B. Thoroughly clean and properly coat forms before reuse.

END OF SECTION 03 11 00



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SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and place reinforcing steel and reinforcing steel accessories in accordance with the drawings and as specified herein.

1.2 REFERENCE STANDARDS

- A. ACI 318 – Building Code Requirements for Structural Concrete and Commentary
- B. ACI SP-66 – ACI Detailing Manual
- C. ASTM A615 – Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- D. ASTM A706 – Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
- E. ASTM A996 – Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
- F. ASTM A1064 – Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- G. AWS D1.4 – Structural Welding Code – Reinforcing Steel
- H. CRSI (DA4) – Manual of Standard Practice

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Indicate bar schedules, sizes, spacings, locations and quantities of reinforcing steel, shapes of bent bars, wire fabric, bending and cutting schedules, splicing locations, stirrup spacing, supporting, and spacing devices.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- D. Welder's Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.
- E. Reports: Submit certified copies of mill test report of supplied reinforcement materials analysis indicating physical and chemical analysis

1.4 QUALITY ASSURANCE

- A. Fabrication tolerances:
 - 1. Sheared length ± 1 inch
 - 2. Overall for stirrups, ties, and spirals $\pm 1/2$ inch
 - 3. All other bends ± 1 inch
- B. Placement tolerance:
 - 1. Spacing $1/4$ inch
 - 2. Clear distance $+ 1/4$ inch
 - 3. Lengthwise location 2 inches
- C. Submit shop fabrication drawings of reinforcement prior to placing concrete.
- D. Perform work of this section in accordance with ACI 315 and ACI 318.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code – Reinforcing Steel".

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Furnish steel reinforcing bars of the type and grade as shown on the contract drawings conforming to the following steel reinforcing bars specifications. If bar type and grade are not shown on the drawings, furnish bars conforming to paragraph B below.
- B. Reinforcing Steel Bars: ASTM A615, Grade 60 billet-steel deformed bars, uncoated as shown on the plans.
- C. Welded Steel Wire Fabric: ASTM A1064 plain type; in flat sheets or coiled rolls uncoated finish as shown on the plans.
- D. Low Alloy Reinforcing Steel Bars: ASTM A706, Grade 60 low alloy steel deformed bars, uncoated as shown on the plans.
- E. Smooth dowel bars for construction joints: ASTM A29, Grade 60.
 - 1. Where indicated, provide metal dowel cap at one end of dowel to permit longitudinal movement of dowel within concrete section.
 - 2. Provide for movement which equals joint width plus one-half inch.
- F. Corrosion Resistant Steel Bars: ASTM A1035-16b, Low Carbon Chromium Steel Reinforcing Bars.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gauge annealed type.
- B. Chairs, Bolster, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

2.3 FABRICATION

- A. Fabricate reinforcement in accordance with ACI 315 and CRSI (DA4) – Manual of Standard Practice.
- B. Locate reinforcing splices only where shown on the drawings. Indicate location of splices on shop drawings.
- C. Weld reinforcing bars only where shown on the drawings. Furnish ASTM A706 reinforcing steel only where welding is required. Weld reinforcing bars in accordance with AWS D1.4.

PART 3 - EXECUTION

3.1 GENERAL

- A. Clean reinforcement of loose or thick rust and mill scale, dirt, paint, oil, grease, earth, ice, and other foreign materials that would reduce bond to concrete.
- B. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
- C. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.2 PLACING

- A. Place all reinforcement in the exact position shown on the plans and approved shop drawings and secure in position during the placing and compacting of concrete. Wire bars together with No. 16 gauge wire with ties at all intersections except where spacing is less than 12 inches in each direction, in which case tie alternate intersections.
- B. Maintain the distance from the forms and between layers of reinforcement by means of prefabricated chairs, precast mortar blocks, ties, hangers, or other approved devices. Placing and fastening of reinforcement in each section of the Work must be approved by the Engineer before any concrete is deposited in the section.
- C. Do not tack weld reinforcing bars.
- D. Overlap sheets of metal mesh 1 square plus 6 inches to maintain a uniform strength, and securely fasten at the ends and edges, and support to maintain clearances.

- E. Support reinforcing steel for formed floor slabs on metal chairs or slab bolsters. Size chairs or bolsters to position the steel in the exact location shown on the plans. Space chairs for supporting the top steel and bolsters for supporting the bottom steel not more than 5 feet on centers in each direction. Plastic coat the portion of the metal support in contact with the forms to prevent rust. Tie down deck steel to beams or forms at regular intervals of not more than 5 feet on centers along the beams to prevent movement of the steel during placing of the concrete.

3.3 SPLICING

- A. Furnish all reinforcement in the full lengths indicated on the plans unless otherwise permitted. Splicing of bars, except where shown on the plans, not permitted without written approval from the Engineer. Stagger splices as far as possible.
- B. Do not use lap splices on No. 14 and 18 bars.
- C. Weld reinforcing steel only if detailed on the drawings
- D. Do not bend reinforcement after embedding in hardened concrete.
- E. Do not extend bars continuously through any expansion joint except expansion dowels.

3.4 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in the General Structural Notes – Special Inspection Tables, will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION 03 20 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish all labor, materials, and equipment required for the construction of cast-in-place concrete as shown on the drawings and as specified herein.

1.2 DEFINITIONS

- A. Cold Weather: When ambient temperature is below 40 degrees Fahrenheit or is approaching 40 degrees Fahrenheit and falling.
- B. Contractor's Licensed Design Engineer: Individual representing Contractor who is licensed to practice engineering as defined by statutory requirements of professional licensing laws in state or jurisdiction in which Project is to be constructed.
- C. Defective Area: Surface defects that include honeycomb, rock pockets, indentations, and surface voids greater than 3/16-inch deep, surface voids greater than 3/4-inch in diameter, cracks in liquid containment structures and below grade habitable spaces that are 0.005-inch wide and wider, and cracks in other structures that are 0.010-inch wide and wider, spalls, chips, embedded debris, sand streaks, mortar leakage from form joints, deviations in formed surface that exceed specified tolerances and include but are not limited to fins, form pop-outs, and other projections. At exposed concrete, defective areas also include texture irregularities, stains, and other color variations that cannot be removed by cleaning.
- D. Exposed Concrete: Concrete surface that can be seen inside or outside of structure regardless of whether concrete is above water, dry at all times, or can be seen when structure is drained.
- E. Hot Weather: As defined in ACI 305.1.
- F. Hydraulic Structure: Liquid containment structure.
- G. New Concrete: Less than 60 days old.
- H. Slurry Mixture: Mixture of sand, 3/8-inch maximum nominal aggregate size, cement, and water for wall construction joints with waterstop.

1.3 REFERENCE SPECIFICATIONS

- A. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
- B. ACI 301 – Specifications for Structural Concrete
- C. ACI 302.1R – Guide for Concrete Floor and Slab Construction

- D. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete
- E. ACI 305R – Guide to Hot Weather Concreting
- F. ACI 306R – Cold Weather Concreting
- G. ACI 308R – Guide to Curing Concrete
- H. ACI 318 – Building Code Requirements for Structural Concrete and Commentary
- I. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
- J. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- K. ASTM C94 – Specification for Ready-Mixed Concrete
- L. ATM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-inch Cube Specimens)
- M. ASTM C143 – Standard Test Method for Slump of Hydraulic Cement Concrete
- N. ASTM C150 – Specification for Portland Cement
- O. ASTM C157 – Standard Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete
- P. ASTM C171 – Specification for Sheet Materials for Curing Concrete
- Q. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete
- R. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- S. ASTM C260 – Specification for Air-Entraining Admixtures for Concrete
- T. ASTM C309 – Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- U. ASTM C494 – Specification for Chemical Admixtures for Concrete
- V. ASTM C618 – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- W. ASTM C881 – Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- X. ASTM C1059 – Specification for Latex Agents for Bonding Fresh to Hardened Concrete
- Y. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic Cement Concrete

- Z. ASTM C1107 – Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)
- AA. ASTM C1240 – Specification for Silica Fume Used in Cementitious Mixtures
- BB. ASTM C1315 – Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
- CC. ASTM C1602 – Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
- DD. ASTM D1751 – Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- EE. ASTM E1155 – Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers
- FF. ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
- GG. ASTM E1745 – Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
- HH. IBC – International Building Code

1.4 JOB CONDITIONS

- A. In hot and cold weather, comply with the requirements of ACI 305 and 306.
- B. Do not place concrete on frozen ground.
- C. Unless adequate protection is provided, do not place concrete during rain, sleet, or snow.
- D. Do not allow rainwater to increase mixing water or damage surface finish.

1.5 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
 - 1. All Structural Concrete mix designs must be submitted separately from mix designs detailed in specification 32 13 13 – Concrete for Exterior Improvements.
- B. Mix Design: Submit mix design to be used for each class of concrete.
 - 1. Submit location of materials source, admixtures to be used, and other related data
 - 2. Submit test reports showing suitability of aggregates used in concrete mixes.
 - 3. Mix designs shall indicate that aggregates to be used are not prone to ASR, or provide test results of successful ASR mitigation using ASTM C1567.

- C. Detailed plan for curing and protection of concrete: Detailed plan for curing and protection of concrete placed and cured in cold weather. Plan shall include, but not be limited to, the following:
 - 1. Procedures for protecting sub grade from frost and accumulation of ice or snow on reinforcement, other metallic embeds, and forms prior to placement.
 - 2. Procedures for measuring and recording temperatures of reinforcement and other embedded items prior to concrete placement.
 - 3. Methods for temperature protection during placement.
 - 4. Types of covering, insulation, housing, or heating to be provided.
 - 5. Curing methods to be used during and following protection period.
 - 6. Use of strength accelerating admixtures.
 - 7. Methods for verification of in-place strength.
 - 8. Procedures for measuring and recording concrete temperatures.
 - 9. Procedures for preventing drying during dry, windy conditions.
- D. Detailed plan for hot weather placements including curing and protection for concrete placed and cured in hot weather. Plan shall include, but not be limited to, the following:
 - 1. Procedures for measuring and recording temperatures of reinforcement and other embedded items prior to concrete placement.
 - 2. Use of retarding admixture.
 - 3. Methods for controlling temperature of reinforcement and other embedded items and concrete materials before and during placement.
 - 4. Types of shading and wind protection to be provided.
 - 5. Curing methods, including use of evaporation retardant.
 - 6. Procedures for measuring and recording concrete temperatures.
 - 7. Procedures for preventing drying during dry, windy conditions.
- E. Informational Submittals:
 - 1. Preinstallation Conference minutes.
 - 2. Manufacturer's application instructions for bonding agent and bond breaker.
 - 3. Manufacturer's Certificate of Compliance to specified standards:
 - a. Bonding agent.

- b. Bond breaker.
- 4. Statement of Qualification:
 - a. Batch Plant: Certification as specified herein.
 - b. Mix designer.
 - c. Installer.
 - d. Testing agency.
- 5. Field test reports.
- 6. Recorded temperature data from concrete placement where specified.
- 7. Tightness test results.
- 8. Concrete Delivery Tickets:
 - a. For each batch of concrete before unloading at Site.
 - b. In accordance with ASTM C94, including requirements 14.2.1. through 14.2.10.
 - c. Indicate amount of mixing water withheld and maximum amount that may be permitted to be added at Site.

1.6 QUALITY ASSURANCE

- A. Concrete construction shall conform to requirements of ACI 117, ACI 301, ACI 318, & ACI 350 except as modified herein.
- B. Qualifications:
 - 1. Batch Plant: NRMCA Program for Certification of Ready-Mixed Concrete Production Facilities or approved equivalent program.
 - 2. Mix Designer: Person responsible for developing concrete mixture proportions certified as NRMCA Concrete Technologist Level 2 or DOT certified mix designer in jurisdiction of the Work. Requirement may be waived if individual is Contractor's Licensed Design Engineer.
 - 3. Testing Agency: Unless otherwise permitted, an independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 - a. Where field testing is required of Contractor, personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

- b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade 1. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician – Grade II.
- C. Preinstallation Conference:
 - 1. Required Meeting Attendees:
 - a. Contractor, including pumping, placing and finishing, and curing subcontractors.
 - b. Ready-mix producer.
 - c. Admixture representative.
 - d. Testing and sampling personnel.
 - e. Engineer who authored Statement of Special Inspection Plan or Engineer's designee.
 - 2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer of location and time.
 - 3. Agenda shall include:
 - a. Admixture types, dosage, performance, and redosing at Site.
 - b. Mix designs, test of mixes, and Submittals.
 - c. Placement methods, techniques, equipment, consolidation, and form pressures.
 - d. Slump and placement time to maintain slump.
 - e. Finish, curing, and water retention.
 - f. Thermal control plan.
 - g. Protection procedures for weather conditions.
 - h. Other specified requirements requiring coordination.
 - 4. Conference minutes as specified in Section 01 31 19 - Project Meetings.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Portland Cement: Use Portland cement conforming to the requirements of ASTM C150 Type II or ASTM C595 Type IL for low alkali cement.

- B. General Admixtures: Admixtures, other than air-entraining agents, may be used when the type and amount to be used are approved. Calcium chloride will not be allowed as an admixture.
- C. Air-Entraining Agents: Use air-entraining agents to the requirements of ASTM C260 added to the mixing water.
- D. Water Reducing Agents: Water reducing or water reducing and retarding admixtures may be used to increase workability of the concrete when approved by the Engineer. Use only admixtures produced by a company approved by the Engineer. Use water reducing admixtures conforming to ASTM C494.
- E. High Range Water Reducer: Conforming to ASTM C494, Type F or G. The preferred admixture shall be free of chlorides and alkalines. A second-generation-type high-range water reducer shall be Type G and be batch-plant-added.
- F. Water: Use potable water for mixing concrete.
- G. Coarse Aggregate: Use coarse aggregate that consists of gravel, crushed slag, crushed stone or other approved inert materials, composed of hard, strong and durable particles, free of injurious coatings, and conforming to the requirements of ASTM C33, except as modified herein.
 - 1. Use only aggregates that include deleterious substances not exceeding the following:

	Percent Passing (by weight)
Soft Fragments	0.20
Coal and Lignite	0.30
Clay Lumps	0.30
Other Deleterious Substances	2.00
Minus 200 Material	1.75

- 2. Use coarse aggregate meeting the following gradations when tested in accordance to the requirements of ASTM C136.

	Percent Passing (by weight)				
Coarse Aggregate Size	1"	3/4"	3/8"	No. 4	No. 8
3/4" to No. 4	100	90-100	20-55	1-10	0-5

- H. Fine Aggregate: Use aggregate of natural sand or other approved inert materials composed of hard, strong, and durable particles conforming to the requirements of ASTM C33 except as modified herein.

1. Use only aggregates that include deleterious substances not exceeding the following:

	Percent (by weight)
Clay Lumps	0.50
Coal and Lignite	0.30
Other Deleterious Substances	2.00
Minus 200 Material	1.75

2. Moisture content of fine aggregate shall not exceed 8 percent.
3. Use fine aggregate that is uniformly graded from coarse to fine within the following gradation, when tested in accordance to the requirements of ASTM C136.

Sieve Size	Percent Passing (by weight)
3/8"	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

- I. Curing Compounds: Use curing compounds that meet the requirements of ASTM C309.
- J. Chemical Hardener:
 1. Colorless, aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent.
 2. Not less than 2 pounds fluosilicate per gallon.
 3. Provide materials which do not react with, inhibit, or otherwise interfere with adhesives and bonding of future floor finishes.
 4. Acceptable Products: L&M Chem-Hard by Laticrete; MasterKure HD 300WB by BASF, or approved alternate.
- K. Waterstops and Joint Fillers:
 1. Waterstop of Joints: Extruded PVC waterstop, shape and size as shown on the drawings. Thermo bond all joints in PVC waterstops.

2. Expansive Water Stop: Expansive waterstop shall be a bentonite/butyl rubber based waterstop that expands on exposure to water. It shall be applied in accordance with manufacturer's recommendations.
 3. Joint Filler: Semi-rigid, closed-cell polypropylene or polyethylene foam expansion joint filler that meets ASTM test method D545 for compression recovery and water absorption. Joint filler cannot absorb water, swell or disintegrate.
- L. Fly ash shall be Class F conforming to AASHTO M 295 with the additional requirement that the available alkalis in the fly ash shall not exceed 2 percent.
- M. Concrete Sealer: Concrete sealer is intended to be used on concrete slabs to prevent dusting and staining. The products listed are not intended to be used as curing compounds or for sealing the slab against water leakage.
1. Manufacturers: One of the following or equal:
 - a. Euco Diamond Hard by Euclid Chemical
 - b. L&M Seal Hard by Laticrete

2.2 PROPORTIONING

- A. In proportioning materials for mixing, use certified scales. Do not use volume measurement except for water and liquid admixtures.
- B. Concrete mixes shall be proportioned as indicated on plans.
- C. Fly ash may be used to replace a portion of the Portland cement in the concrete mix. The fly ash used shall not exceed 25 percent of the total cement material in the mix. The cement material in the mix includes both Portland cement and fly ash.
- D. If the mix designer cannot provide documentation indicating that aggregates provided are not prone to ASR, then the proposed aggregate for the mix shall be tested for expansion and Alkali-Silica Reaction (ASR) in accordance with AASHTO T 303. Where testing indicates aggregates are reactive, the Contractor shall use fly ash, lithium compound admixtures or both to produce a concrete mix that successfully mitigates ASR. Contractor shall provide test results of successful mitigation using ASTM C1567, with results showing a linear expansion at 14 days not exceeding 0.10 percent when tested.

2.3 READY MIX CONCRETE

- A. Ready-mixed concrete shall conform to the provisions in AASHTO M157 regarding batching, mixers and agitators, mixing and delivery, inspection, consistency and air content, and certification of batches.

2.4 GROUT

- A. Where grout is shown for leveling, concrete that is at least 3" thick (at least 4,000 pounds per square inch) shall be used. Grout and concrete fill concrete mix shall contain 1.5 pound of polypropylene micro fiber per cubic yard of concrete.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify lines, levels, and dimensions before proceeding with Work of this section.
- B. Coordinate placement of embedded items with erection of concrete formwork and placement form accessories.
- C. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent according to bonding agent manufacturer's instructions.
 - 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
 - 2. Use latex bonding agent only for non-load-bearing applications.
- D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels, and pack with non-shrink grout.

3.2 CONVEYING

- A. Handle concrete from mixer to location of final placing as rapidly as practicable by methods which prevent segregation or loss of ingredients and assure that quality is maintained.
- B. Use only equipment conforming to ASTM C94.
- C. Use only approved pumping equipment that is rated for the lift and the capacity required for placement.
 - 1. Control pneumatic placement to prevent segregation.
 - 2. Loss of slump in pumping or pneumatic conveying equipment shall not exceed 2 inches.
 - 3. Do not use aluminum or aluminum alloy pipes.

3.3 PLACING CONCRETE

- A. Notify Engineer not less than 24 hours prior to commencement of placement operations.
- B. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- D. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer. Where approved, record the amount of water added on site and provide with the special inspection reports.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Place concrete continuously or in layers of such thickness that no concrete is deposited on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within section.
 - 1. If a section cannot be placed continuously, locate construction joints as indicated, or as approved by the Engineer.
 - 2. If not indicated, locate construction joints not over 20 feet on center.
 - 3. Place at such a rate that concrete which is being integrated with fresh concrete is still plastic.
 - 4. Limit size of each placement to allow for strength gain and volume change as a result of shrinkage.
 - 5. Make lifts not over 24 inches.
 - 6. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials.
 - 7. Remove temporary spreaders in forms where concrete placing has reached an elevation rendering their service unnecessary.
 - 8. Temporary spreaders may remain embedded in the concrete only if made of metal or concrete, and if prior approval has been obtained.
 - 9. Do not allow concrete to fall over 6 feet, except when starting a wall pour. Do not drop concrete over 24 inches when starting a wall pour.
 - 10. Joints in Footings and Slabs:
 - a. Ensure space beneath plastic waterstop is completely filled with concrete.
 - b. During concrete placement make visual inspection of entire waterstop area.
 - c. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift waterstop to confirm full consolidation without voids, and place remaining concrete to full height of slab.
 - d. Apply procedure to full length of waterstop.

- F. Deposit concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing.
- G. Control placement to prevent segregation.
- H. Pumping of Concrete:
 - 1. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to ensure completion of concrete placement without cold joints in case of primary placing equipment breakdown.
 - 2. Minimum Pump Hose (Conduit) Diameter: 4 inches.
 - 3. Replace pumping equipment and hoses (conduits) that are not functioning properly.
- I. Minimum Time between Adjacent Placements:
 - 1. Construction or Control Joints: 7 days unless otherwise specified.
 - 2. Construction joint between top of footing or slab, and column or wall: As soon as can safely be done without damaging previously cast concrete or interrupting curing thereof, but not less than 24 hours.
 - 3. Expansion or Contraction Joints: 1 day.
 - 4. For columns and walls with a height in excess of 10 feet, wait at least 2 hours before depositing concrete in beams, girders, or slabs supported thereon.
 - 5. For columns and walls 10 feet in height or less, wait at least 1 hour prior to depositing concrete in beams, girders, brackets, column capitals, or slabs supported thereon.
- J. Hot Weather:
 - 1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 301, ACI 305.1, and as follows:
 - a. Maintain concrete temperature below 90 degrees Fahrenheit at time of placement or furnish test data or other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking as a result of heat of hydration. Cool ingredients before mixing to maintain fresh concrete temperatures as specified or less.
 - b. Provide windbreaks, shading, fog spraying, sprinkling, ice, wet cover, or other means as necessary to maintain concrete at or below specified temperature.
- K. Cold Weather Placement:

1. Unless otherwise permitted, shall be in accordance with requirements of ACI 306.1 and as follows:
 - a. Cold weather requirements shall apply when ambient temperature is below 40 degrees Fahrenheit or approaching 40 degrees Fahrenheit and falling.
 - b. Do not place concrete over frozen earth or against surfaces with frost or ice present. Frozen earth shall be thawed to acceptance of Engineer.
 - c. Unless otherwise permitted, do not place concrete in contact with surfaces less than 35 degrees Fahrenheit; requirement is applicable to all surfaces including reinforcement and other embedded items.
 - d. Provide supplemental external heat as needed when other means of thermal protection are unable to maintain minimum surface temperature of concrete as specified in ACI 306.1.
 - e. Maintain minimum surface temperature of concrete as specified in ACI 306.1 for no less than 3 days during cold weather conditions.
 - 1) Protect concrete from freezing until end of curing period and until concrete has attained a compressive strength of 3,500 pounds per square inch or design compressive strength if less than 3,500 pounds per square inch.
2. Provide maximum and minimum temperature sensors placed on concrete surfaces spaced throughout Work to allow monitoring of concrete surface temperatures representative of Work. Unless otherwise permitted, record surface temperature of concrete at least once every 12 hours during specified curing period.

3.4 CONSOLIDATION

- A. Consolidate by vibration so that concrete is thoroughly worked around reinforcement, embedded items, and into corners of forms to eliminate air or stone pockets.
- B. Use internal vibrators with minimum frequency of 8,000 vibrations per minute. Do not use “jitterbugs” or similar devices.
- C. Do not use vibrators to transport concrete.
- D. Insert vibrators approximately 18 inches apart. Leave in long enough to consolidate concrete without segregation; generally, from 5 to 15 seconds maximum. Insert vibrator through new lift into previous lift to ensure good bond between lifts.
- E. Keep spare vibrator available during concrete operations.
- F. Vibrate concrete in vicinity of joints to obtain impervious concrete.
- G. Where concrete is to have an as-cast or smooth-rubbed finish, bring a full surface of mortar against form by vibration process, supplemented if necessary, by spading, to work coarse aggregate back from formed surface.

3.5 CONSTRUCTION JOINTS

- A. Locate construction joints, if not indicated, so as to least impair strength of structure, subject to Engineer approval.
 - 1. In general, locate near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point. In this case, offset joints in girder a distance equal to twice the width of the beam.
 - 2. Locate joints in walls and columns at underside of floors, slabs, beams or girders, and at tops of footings or floor slabs.
 - 3. Place beams, girders, brackets, column capitals, haunches, drop panels, and slabs concurrently.
 - 4. Make joints perpendicular to main reinforcement.
- B. Continue reinforcement across joints.
 - 1. Provide keys and inclined dowels as directed by Engineer.
 - 2. Provide longitudinal keys at least 1-1/2 inches deep in all joints in walls and between walls and slabs or footings.
- C. Clean concrete surface at joints.
- D. Remove all laitance prior to placing adjoining concrete.
- E. When required, obtain bond by one of the following:
 - 1. Use of an approved adhesive.
 - 2. Use of an approved chemical retarder which delays setting of surface mortar. Remove retarded mortar within 24 hours after placing to produce a clean, exposed aggregate bonding surface.
 - 3. Roughen surface of concrete in an approved manner which will expose aggregate uniformly.
- F. Dampen, but do not saturate, hardened concrete at construction joints, joints between footings and walls or columns, between walls or columns and beams or floors they support, joints in unexposed walls and all others not mentioned below immediately prior to placing fresh concrete.
- G. Dampen, but do not saturate hardened concrete at joints in exposed Work; joints in middle of beams, girders, hoists, and slabs; and joints in Work designed to contain liquids.
 - 1. Thoroughly cover with a coat of cement grout of similar proportions to mortar in concrete.
 - 2. Use grout as thick as possible on vertical surfaces and at least 1/2 inch thick on horizontal surfaces.

3. Place fresh concrete before grout has attained its initial set.
- H. Prepare joints receiving an adhesive and apply adhesive in accordance with manufacturer's recommendations prior to placing of fresh concrete.
- I. Prior to placing of fresh concrete, prepare surfaces of joints which have been treated with a chemical retarder in accordance with manufacturer's recommendations.

3.6 BLOCKOUTS FOR PIPE AND CONDUIT

- A. Where pipe or conduit passes into or through concrete walls, floor slabs, the Contractor may, to facilitate proper alignment, leave holes through the concrete and pour the concrete opening after the pipe or conduit is in place. The size of such openings shall be 2 inches larger than the outside diameter of the bell, flange, or coupling, and shall conform to the special details for pipe openings shown on the plans. When the piping or conduit is entirely placed and securely anchored, the concrete openings through the walls will be poured in accordance with the requirements for bonding new concrete to old as set forth herein. Concrete used to pour these openings shall consist of 1 part cement, 1 part fine aggregate, 1 part non-shrinking aggregate, and 1-1/2 parts coarse aggregate of maximum size of 1/2 inch when the concrete is part of a basin which must hold liquids. Otherwise, the non-shrinking aggregate in these proportions shall be replaced by fine aggregate. Concrete poured in these openings shall be thoroughly vibrated or rodded to insure a watertight joint between the new and old concrete and the new concrete and the pipe or conduit. The form for the closure shall be constructed with a pouring funnel. A plug of concrete shall be left in the pouring funnel. After the concrete has taken its initial set, the plug shall be removed and the exposed, broken face ground smooth. Pouring of blockout holes shall be done from the pressure side whenever possible. Such joints shall be thoroughly cured by keeping them constantly wet for not less than 7 days.
- B. Where approved by the Engineer, blockout holes may be dry packed using non-shrink grout for basins which must hold liquid, and normal grout in other places. Only sufficient water shall be added to make a dry, crumbling mass. When the mixture is pressed tightly together into a ball with the hands, there should not be sufficient water in the mixture to stain the hands, and when such a ball is broken, it should crumble. This mixture shall be tamped or rodded solidly into the space, preferably from the pressure side. A backing board or stop shall be provided at the back side of this space against which the mixture can be tamped. Curing shall be specified as above.

3.7 GROUTING MACHINERY FOUNDATIONS

- A. Where machinery is to be secured by anchor bolts set in concrete and supported on foundations which are to be grouted in place, the original concrete pour shall be blocked out or finished off a sufficient distance below the bottom of the machinery foundation to provide for the thickness of grout specified on the plans. After the machinery has been set in position and wedged to the proper elevation by steel wedges, the space between the bottom of the machinery foundation and the original pour of concrete shall be caulked with a dry-tamped in mixture of non-shrink grout. When the mixture is pressed tightly together into a ball with the hands, there should not be sufficient water in the mixture to stain the hands; and when such ball is broken, it should crumble. This dry mixture shall be tamped or rodded solidly into the space between the machinery foundations and the original

concrete. A backing board or stop shall be provided at the back side of this space against which the dry mixture can be tamped.

3.8 PLACING SLABS

A. Preparation of sub-grade for Slabs on Grade:

1. Slabs on grade shall be placed on 6" minimum base course, over engineered fill, over a properly prepared sub-base. With the base course, structural fill and sub-base materials, thickness and compaction meeting the requirements of the geotechnical report. The geotechnical engineer or their representative shall review and approve all base course, structural fill and sub-base installation.
2. Keep subgrade free of frost.
3. If the temperature where the concrete is to be placed is below freezing, enclose, heat, and maintain temperature above 50 degrees Fahrenheit, long enough to remove all frost from subgrade.
4. Keep subgrade moist at time of concreting. If necessary, dampen with water in advance of concreting. Allow no free-standing water or muddy or soft spots when concrete is placed.

B. Locate Joints in Slabs as Indicated:

1. If saw-cut joints in slabs on grade are required or permitted, time cutting to eliminate raveling during sawing and before shrinkage cracks develop.
2. Cut as soon as concrete has hardened sufficiently to prevent aggregates being dislodged by saw.
3. Compact before shrinkage stresses become sufficient to produce cracking.

C. Thoroughly Consolidate Concrete in Slabs:

1. Obtain consolidation of slabs with vibrating screeds, roller pipe screeds, internal vibrators, or other approved means.

3.9 PATCHING

- A. Repair surface defects immediately after form removal. Coat all repaired areas with grey Sikagard 62.
- B. Fill and finish tie holds with non-shrink grout and coat with grey Sikagard 62.
- C. Repair defective areas.
 1. Use of plaster coat embeco or calcium chloride is prohibited.
 2. Remove honeycomb and defective concrete down to sound concrete.
 3. Make edges perpendicular to surface or slightly undercut.

4. Feathered edges are not permitted.
 5. Dampen area to be patched and at least 6 inches surrounding it to prevent absorption of patching mortar water.
 6. Prepare bonding grout of approximately 1 part cement to 1 part fine sand passing a No. 30 sieve.
- D. Make patching mixture of same materials and of approximately same proportions as used for concrete, except omit coarse aggregate.
1. Mortar: 1 part cement to 2 parts sand by damp loose volume.
 2. Mix white and gray Portland cement as required to match surrounding concrete.
 3. Keep mixing water to a minimum.
 4. Mix patching mortar in advance and allow to stand with frequent manipulation, without addition of water, until it has reached stiffest placeable consistency.
- E. After surface water has evaporated from patch area, brush bond coat into surface.
1. When bond coat begins to lose water sheen, apply patching mortar.
 2. Thoroughly consolidate mortar into place and strike-off so as to leave patch slightly higher than surrounding surface.
 3. Leave undisturbed for at least 1 hour before final finish.
 4. Keep patched area damp for 7 days.
 5. Do not use metal tools in finishing an exposed patch.
- F. Repair of concrete shall provide structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable by Engineer.
- G. Tie Holes: After being cleaned and thoroughly dampened, fill tie holes solid with non-shrink grout and coat with Sikagard 62. Round tie holes less than 1/4 inch diameter by 1-1/2 inch deep in rough form finished surfaces need not be filled.
- H. Remove metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, by chipping back concrete to a depth of 1 inch and then cutting or removing metal object. Repair chipped out concrete as specified for defective areas.

3.10 SLAB FINISHES

- A. Float Finish: After concrete has been placed, consolidated, struck-off, and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared, and surface has stiffness sufficient to permit operation. Re-float slab immediately to a uniform sandy texture.

- B. Troweled Finish: Float finish surface first. Power or hand trowel to produce smooth surface relatively free of defects, but which may still show some trowel marks. Final trowel when a ringing sound is produced as trowel is moved over surface. Leave finished surface essentially free of trowel marks, uniform in texture and appearance.
- C. Broom Finish: Immediately after concrete has been floated, apply coarse transverse scored texture by drawing broom or burlap belt across surface.
- D. "Dry Shake" Finish: Give surface a float finish. Apply mineral aggregate with Portland cement in proportions recommended by manufacturer of aggregate. Begin floating immediately after application of "dry shake."
- E. Nonslip Finish: Give surface a "dry shake" application, as specified above, using crushed ceramically bonded aluminum oxide particles. Apply at 25 pounds per 100 square feet.
- F. Exposed Aggregate Finish: Immediately after the surface of the concrete has been leveled to tolerance and surface water has disappeared, spread aggregate of the color and size selected by the Engineer uniformly over surface to provide complete coverage to the depth of a single stone. Float surface until embedded aggregate is fully coated with mortar and surface has been brought to tolerance. Flow water, without force, over surface of concrete while matrix encasing aggregate is removed by brushing with a fine bristle brush.
- G. Slab Finish Schedule: The slab finishes are shown on the drawings. Where finishes of slabs are not shown, provide broom finish on exterior slabs and trowel finish on interior slabs.
- H. Finish Slab Elevation: Slope slabs to floor drains and gutters. Slabs shall adequately drain regardless of tolerances.

3.11 FORMED CONCRETE FINISH

- A. Rough Finish: Patch defects, chip or rub off fins exceeding 1/4-inch in height.
- B. Smooth Finish: Patch tie holes and defects and remove fins completely. When surface texture is impaired and form joints misaligned by more than 1/8-inch, grind or bushhammer. Slurry grout areas evidencing minor mortar leakage to match adjacent concrete.
- C. Rubbed Finish: Remove forms and perform necessary patching as soon after placement as possible. Finish newly hardened concrete no later than day following form removal. Wet surfaces and rub with carborundum brick or other abrasive until uniform color and texture are produced. No cement grout to be used other than cement paste drawn from concrete by rubbing process.
- D. Sacked Finish: Mix one-part Portland cement and 1-1/2 parts fine sand with sufficient water to produce grout having consistency of thick paint or use commercial premixed sacking grout. Wet surface of concrete sufficiently to prevent absorption of water from grout. Apply grout uniformly. Immediately after grouting, scrub surface vigorously with cork float or stone to coat surface and fill voids. While grout is still plastic, remove excess grout by working surface with rubber float or sack. After surface whitens from drying, rub vigorously with clean burlap. Keep damp for at least 36 hours after final rubbing.

- E. Formed Concrete Finish Schedule. The finish required for formed concrete is shown on the drawings. Where finishes of formed concrete are not shown, provide rough finish for concrete not exposed to view and rubbed finish for concrete exposed to view.

3.12 CURING AND PROTECTION

- A. To preserve moisture in unformed concrete surfaces, apply one of the following immediately after placement and finishing.
 - 1. Continuous mist spray.
 - 2. Waterproof sheet materials, ASTM C171.
 - 3. Curing compound, ASTM C309. Apply in accordance with recommendations of manufacturer immediately after water sheen has disappeared. Do not use on any surface against which additional concrete or other material is to be bonded or adhesively applied, unless it is proven that curing compound will not prevent bond, or unless positive measures are taken to remove it completely from areas to receive bonded applications. Provide curing compound compatible with hardener in areas where hardener is to be used.
- B. Continue curing concrete for 7 days.
- C. When mean daily outdoor temperature is less than 40 degrees Fahrenheit, maintain temperature of concrete between 50 degrees Fahrenheit and 70 degrees Fahrenheit for concrete placement.
- D. Floors and slabs to receive concrete sealer as specified in the Contract Documents and Room Finish Schedule.
 - 1. Apply concrete sealer at a coverage rate not to exceed 300 square feet per gallon.
 - 2. Apply as soon as slab or floor will bear weight.
 - 3. Before applying concrete sealer, sweep entire surface clean with very soft bristled brush that will not mark concrete finish and remove any standing water.
 - 4. Apply concrete sealer with sprayer.
 - 5. Use of paint rollers or mop is not acceptable.
 - 6. Workmen shall wear flat soled shoes which will not mark or scar concrete surface.
 - 7. Do not allow traffic on floors and slabs until concrete sealer has dried and hardened.

3.13 BACKFILL AGAINST STRUCTURES

- A. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.

- B. Refer to General Structural Notes on the Drawings for additional requirements, including elevated slab and diaphragm completion prior to backfill.
- C. Shore exterior stem walls of Storage Building taller than 3'-0" until the interior slab on grade is completely in place and has reached 75% of its design strength.
- D. Unless otherwise permitted, place backfill simultaneously on both sides of structure, where such fill is required, to prevent differential pressures.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by the Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland Cement to two and one half parts fine aggregate passing No 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2-inch in any dimension in solid concrete, but not less than 1-inch in depth. Make edge of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Patch a test area at an inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by the Engineer.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.1-inches wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4-inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
5. Repair defective areas, except random cracks and single holes 1-inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of the same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
6. Repair random cracks and single holes 1-inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
7. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.15 FIELD QUALITY CONTROL

- A. The Contractor shall obtain and pay for services of certified independent testing agency, as specified in the General Structural Notes – Special Inspection Tables. They shall perform sampling and testing of installed materials to assure that the requirements of this specification are met.
- B. Provide adequate facilities for safe storage and proper curing of concrete test specimens onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
- C. Unless otherwise specified, sample concrete for testing for making test specimens, from point of delivery.
- D. When concrete is pumped, sample and test air content at point of delivery and at point of placement.
- E. The frequency herein specified for each field control test is approximate. A greater or lesser number of tests may be made, as required by the Engineer, to verify compliance with these specifications.
- F. Submit proposed mix design of each class of concrete to Engineer for review prior to commencement of Work.
- G. Each 100 tons of fine aggregate and each 200 tons of coarse aggregate shall be sampled and tested in accordance with ASTM D75 and C136.

- H. Entrained air: Test every load of concrete delivered to the project. Air content shall be determined in accordance with ASTM C231.
- I. Slump: Test every load of concrete delivered to the project.
- J. Pumped Concrete: Take concrete samples for slump, ASTM C143 and test specimens ASTM C31.
- K. Strength characteristics: 1 set of 4 concrete test cylinders shall be made for every 40 cubic yards or less of each class of concrete placed each day. 1 additional set shall be taken from each additional 40 cubic yards, or major fraction thereof, placed in any 1 day. 1 cylinder of each set shall be tested at an age of 7 days and 2 cylinders shall be tested at an age of 28 days. The fourth cylinder of the sets shall be tested only if deemed necessary by the Engineer. Test results shall be evaluated in accordance with ACI 214 and 318.
- L. 3 additional test cylinders will be taken during cold weather and shall be cured on site under the same conditions as the concrete it represents. 1 cylinder shall be tested at an age of 7 days and the other cylinder at an age of 28 days.

3.16 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Engineer and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances, or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by the Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

END OF SECTION 03 30 00

SECTION 03 60 00 – GROUTING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish labor, materials and equipment as required for grouting as shown on the plans.
- B. The following types of grout are covered in this Section:
 - 1. Cement Grout
 - 2. Non-Shrink Grout – Class I (cement based)
 - 3. Non-Shrink Grout – Class II (cement based)
 - 4. Epoxy Anchor Grout for Adhesive Anchors
 - 5. Topping Grout and Concrete/Grout Fill

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 – Submittal Procedures.
 - 1. Certification of Materials:
 - a. Use bags of materials showing that the contents meet the Specifications.
 - b. Submit mill test certificates covering materials shipped as furnished by material manufacturers.
 - 2. Certification that grouts used on the project contain no chlorides or other chemicals that cause corrosion.
 - 3. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, curing and appropriate uses for each type of grout used in the Work, and locations of use. ICBO/ES report shall be submitted for epoxy anchor grout for adhesive anchors.
 - 4. Manufacturer's certification that its non-shrink grout does not contain aluminum, zinc, or magnesium powders as a method of expansion.
 - 5. Contractor shall submit manufacturer's written warranty.

1.3 QUALITY ASSURANCE

- A. Construction Tolerances: Construction tolerances shall be as indicated in Section 03 30 00 – Cast-in-Place Concrete unless indicated otherwise.
- B. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Engineer to ensure continued compliance with these specifications. The specimens will be made by the Engineer or its representative.
2. Compression tests and fabrication of specimens for concrete grout and cement based non-shrink grout will be performed in accordance with ASTM C1107 – Packaged Dry, Hydraulic-Cement Grout (Non-shrink), at intervals during construction selected by the Engineer. A set of 3 specimens will be made for testing at 7 days, 28 days, and each additional time period as appropriate.
3. Compression tests and fabrication of specimens for topping grout, and concrete/grout fill will be performed in accordance with Section 03 30 00 – Cast-in-Place Concrete, at intervals during construction as selected by the Engineer.
4. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C579 – Test Methods for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfaces and Polymer Concretes, Method B, at intervals during construction as selected by the Engineer. A set of 3 specimens will be made for testing at 7 days, and each earlier time period as appropriate.
5. The cost of laboratory tests on grout will be paid by the Contractor.
6. The Contractor shall assist the Engineer in obtaining specimens for testing and shall furnish materials necessary for fabricating the test specimens

PART 2 - PRODUCTS

2.1 CEMENT GROUT

- A. Cement grout shall be composed of 1 part cement, 3 parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28 days shall be 4,000 pounds per square inch.
- B. Cement-based non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas-liberating, non-metallic, cement type grout requiring only the addition of water. Cement from kilns burning metal-rich hazardous waste fuel shall not be used.
- C. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout indicated herein shall be that recommended by the manufacturer for the particular application.
- D. Grout shall not contain chlorides or additives that may contribute to corrosion and shall be formulated to be used at any consistency from fluid to plastic.
- E. Cement-based non-shrink grout shall have the following minimum properties when tested at a fluid consistency at 28 days:

1. Minimum tensile splitting strength of 500 pounds per square inch per ASTM C496 - Splitting Tensile Strength of Cylindrical Concrete Specimens.
2. Minimum flexural strength of 1,000 pounds per square inch per ASTM C580 - Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
3. Minimum bond strength (concrete to grout) of 1,900 pounds per square inch per modified ASTM C882 - Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
4. Grout shall be certified for use in freeze/thaw environments.

2.2 NON-SHRINK GROUT

- A. Class I Non-Shrink Grout: Class I non-shrink grout shall have a minimum 28 day compressive strength of 5,000 pounds per square inch when mixed at a fluid consistency. Class I non-shrink grout shall meet the requirements of ASTM C1107, Grade B or C, when mixed to fluid, flowable and plastic consistencies.
 1. Grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827 - Early Volume Change of Cementitious Mixtures. The grout when tested shall not bleed or segregate at maximum allowed water.
 2. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090 - Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout.
 3. Furnish certification that the non-shrink property of grout is not based on gas production or gypsum expansion.
 4. Class I Non-Shrink Grout shall be MasterFlow 713 by BASF; Five Star Grout by Five Star Products; Sikagrout 212 by Sika Corporation; L&M Duragrout by Laticrete; High-Flow Grout by Euclid Chemical Company; or equal.
- B. Class II Non-Shrink Grout: Class II non-shrink grout shall be a high precision, fluid, extended working time, grout. The minimum 28-day compressive strength shall be 7500 pounds per square inch, when mixed at a fluid consistency. Grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827. Class II non-shrink grout shall meet the requirements of ASTM C1107 Grade B or C when tested using the amount of water needed to achieve fluid consistency per ASTM C939.
 1. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.

2. Class II non-shrink grout shall have an extended working time of 30 minutes minimum when mixed to a fluid consistency as defined in ASTM C827 at temperature extremes of 45 to 90 degrees Fahrenheit in accordance with ASTM C1107.
3. The grout when tested shall not bleed or segregate at maximum allowed water content.
4. Provide certification that its non-shrink property is not based on gas production or gypsum expansion.
5. Class II non-shrink grout shall be Masterflow 928 by BASF; Five Star Fluid Grout 100 by Five Star Products; L&M Crystex by Latitcrete; or equal.

2.3 EPOXY ANCHOR GROUT

- A. Epoxy anchor grout shall conform to ASTM C881 - Epoxy-Resin-Base Bonding Systems for Concrete, Type IV, Class A, Band C, Grade 3 with the exception of gel time.
- B. Heat deflection temperature per ASTM D648 - Deflection Temperature of Plastics Under Flexural Load shall be a minimum 120 degrees Fahrenheit.
- C. Manufacturer shall certify that the epoxy anchor grout will maintain 90 percent of its strength up to a temperature of 125 degrees Fahrenheit.
- D. Grout shall come in a 2 chambered cartridge with a metering system that provides the proper ratio of hardener and resin. The grout shall also come with a static mixer nozzle to thoroughly mix the hardener and resin together.
- E. Epoxy anchor grout shall be capable of being used in submersed applications once cured.
- F. Compressive strength per ASTM D695 - Compressive Properties of Rigid Plastics shall be 10,000 pounds per square inch minimum.
- G. If the average working or operating temperature will be over 100 degrees Fahrenheit or in a high fire risk area, use cement based non-shrink grout and oversized holes.
- H. Overhead anchors and anchors in fire-resistive construction shall be cast-in anchors.
- I. Embedment of adhesive anchors/rebar shall be deep enough to develop the anchor/rebar. Embedment shall not exceed 67 percent of the member depth.
- J. Epoxy anchor grout shall be SET-XP by Simpson; Pure110+ by DeWalt; RE 500 V3 by Hilti, or equal.

2.4 TOPPING GROUT AND CONCRETE/GROUT FILL

- A. Where fill is thicker than 3 inches, structural concrete, as indicated in Section 03 30 00 - Cast-in-Place Concrete, may be used when accepted by the Engineer.

- B. Grout for topping of slabs and concrete/grout fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and be mixed as indicated herein. Materials and procedures indicated for normal concrete in Section 03 30 00 - Cast-in-Place Concrete shall apply unless indicated otherwise.
- C. Topping grout and concrete/grout fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water cement ratio of 0.45.
- D. Coarse aggregate shall be graded as follows:

U.S. Standard Sieve Size	Percent by Weight Passing
1/2	100
3/8	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

- E. Final mix design shall be as determined by trial mix design as indicated in 03 30 00 – Cast-in-Place Concrete, except that drying shrinkage tests are not required.
- F. Strength: Minimum compressive strength of topping grout and concrete/grout fill at 28 days shall be 4,000 pounds per square inch.

2.5 CURING MATERIALS

- A. Curing materials shall be in accordance with Section 03 30 00 – Cast-in-Place Concrete and as recommended by the manufacturer of prepackaged grouts.

2.6 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where dry pack is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.
- B. The slump for topping grout and concrete/grout fill shall be adjusted to match placement and finishing conditions but shall not exceed 4 inches.

2.7 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY. STORAGE AND HANDLING

- A. Grout shall be stored in accordance with manufacturer's recommendations.

3.2 GENERAL

- A. Contractor shall arrange for the manufacturer of prepackaged grouts to provide on-Site technical assistance within 72 hours of request, as part of the Work.
- B. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the Engineer.
- C. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of the saturation period, excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.
- D. Surface preparation, curing, and protection of cement grout shall be in accordance with Section 03 30 00 – Cast-in-Place Concrete. The finish of the grout surface shall match that of the adjacent concrete unless otherwise indicated.
- E. Surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete, and other deleterious materials.
- F. Contact the grout manufacturer's representative for assistance on hot and cold weather grouting techniques and precautions if applicable. Shade the Work from sunlight for at least 24 hours before and 48 hours after grouting.

3.3 APPLICATION

- A. Unless indicated otherwise, grouts shall be provided as listed below:

Application	Type of Grout
Anchor bolts and reinforcing steel required to be set in grout in which the average working or operating temperature will be over 100 degrees Fahrenheit, or in high fire risk areas.	Non-Shrink – Class I
Anchor bolts and reinforcing steel required to be set in grout that is not high temperature or high fire risk areas.	Epoxy Anchor Grout
Beam and column (1 or 2 story) base plates less than 16 inches in the least dimension.	Non-Shrink Class I
Column base plates (greater than 2 story or larger than 16 inches in the least dimension).	Non-Shrink Class II
Storage tanks and other non-motorized equipment and machinery under 30 horsepower.	Non-Shrink Class I

Machinery over 30 horsepower and equipment under 30 horsepower but subject to severe shock load and high vibration.	Non-Shrink Class II
Filing blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-Shrink Class I (Class II where placement time exceeds 20 min.)
Under precast concrete elements.	Non-Shrink Class II
Topping and concrete/grout fill greater than 3 inches thick.	Structural Concrete per Section 03 30 00 – Cast-in-Place Concrete
Surface repairs.	Cement Grout
Repair of holes and defects in concrete members which are not water bearing and not in contact with soil or other fill material.	Non-Shrink Class I
Repair of holes and defects in concrete members which are water bearing or in contact with soil or other fill materials.	Non-Shrink Class II
All application not listed above, where grout is called for on the drawings.	Non-Shrink Class I, unless noted otherwise.

3.4 GROUTING PROCEDURES

- A. Mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- B. Structural, equipment, tank, and piping support bases shall be grouted, unless indicated otherwise.
 1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout, or a thickness as indicated.
 2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout through a headbox of appropriate size. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against retaining surfaces, and joints shall be sealed as recommended by the grout manufacturer to be liquid-tight. Forms shall be coated as recommended by the grout manufacturer for easy form release. Where this method of placement is not practical or where required by the Engineer, alternate grouting methods shall be submitted for acceptance by the Engineer.

- C. Drilled anchors and Reinforcing Bars: Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions. Holes shall be roughened with a brush on a power drill and cleaned. Drilled anchors shall not be installed until the concrete has reached the required 28 day compressive strength. Anchors shall not be loaded until the grout has reached its indicated strength in accordance with the manufacturer's instructions.
1. The Contractor shall identify position of reinforcing steel and other embedded items prior to drilling holes. Care shall be exercised in coring and drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and communications conduit, and piping.
- D. Epoxy Adhesive Anchors: Grout shall be proportioned and mixed with automatic equipment. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the manufacturer's recommendations, but shall not be less than 8 diameters for threaded rod, or 12 diameters recommendations for reinforcing or smooth bars. Holes shall be dry.
- E. Cement Based Non-Shrink Grout: In places of high temperature or fire hazard, anchor bolts shall be grouted in using cement based non-shrink grout, Class I. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the manufacturer's ICBO report, but shall not be less than 16 diameters for threaded rod or 24 diameters for reinforcing or smooth bars.
1. When the bolt diameter is 1 inch or less, the hole diameter should be a minimum of 2-inches. When the bolt diameter is greater than 1 inch, the hole diameter should be at least twice the bolt diameter.
 2. Drilled holes shall be saturated with water for not less than 24 hours before installation of anchor/rod/rebar.
 3. The non-shrink grout should be placed in the holes in a non-sag (trowelable) consistency. The grout should be placed in the holes before the anchor and then the anchor inserted and vibrated to ensure proper coverage.
- F. Topping Grout and Concrete/Grout Fill: Mechanical, electrical, and finish work shall be completed prior to placement of topping or concrete/grout fill. To ensure bonding to the base slab, the base slab shall be given an exposed aggregate finish. Alternatively, where accepted by the Engineer, the base slab shall be given a roughened textured surface by a close-spaced rake while the surface is green. After curing, high pressure washing shall expose the aggregates and produce not less than a 3/16 inch amplitude roughness. Jackhammers or chipping hammers shall not be used.
1. The minimum thickness of grout topping and concrete/grout fill shall be 1 inch. Where the finished surface of concrete/grout fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2 inches wide by 1-1/2 inches deep.

2. The base slab shall be thoroughly cleaned and wetted to Saturated Surface Dry (SSD) condition per the International Concrete Repair Institute (ICRI) -- Technical Guide for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, prior to placing topping and fill. No topping concrete shall be placed until the slab is completely free from standing pools or ponds of water. A thin coat of neat cement grout shall be broomed into the surface of the slab just before topping or fill placement. The neat cement grout shall not be allowed to dry before topping placement. If it does dry, it must be immediately removed using wet stiff brooms and reapplied. The topping and fill shall be compacted by rolling or thorough tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade. Coat surface with evaporation retardant as needed to prevent plastic shrinkage cracks.
3. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.
4. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping or fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement, or mixture of dry cement and sand shall be applied to the surface.
5. As soon as topping or fill finishing is completed, coat surface with curing compound. After the topping is set and sufficiently hard in clarifiers and where required by the Engineer, the tank shall be filled with sufficient water to cover the entire floor for 14 days.

3.5 CONSOLIDATION

- A. Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

3.6 CURING

- A. Cement based grouts shall be cured per Section 03 30 00 – Cast-in-Place Concrete and per the manufacturer's recommendations.

3.7 GROUTING MACHINERY FOUNDATIONS

- A. Where machinery is to be secured by anchor bolts set in concrete and supported on foundations which are to be grouted in place, the original concrete pour shall be blocked out or finished off a sufficient distance below the bottom of the machinery foundation to provide for the thickness of grout specified on the Plans. After the machinery has been set in position and wedged to the proper elevation by steel wedges, the space between the bottom of the machinery foundation and the original pour of concrete shall be caulked with a dry, tamped-in mixture of non-shrink grout. When the mixture is pressed tightly together into a ball with the hands, there should not be sufficient water in the mixture to stain the hands; and when such ball is broken, it should crumble. This dry mixture shall be tamped or rodded solidly into the space between the machinery foundations and the original concrete. A backing board or stop shall be provided at the back side of this space against which the dry mixture can be tamped.

END OF SECTION 03 60 00

SECTION 04 22 00 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install concrete masonry unit as shown on the Drawings and as specified herein.

1.2 REFERENCE STANDARDS

- A. ASTM A153 – Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- B. ASTM A307 – Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength
- C. ASTM A563 – Specification for Carbon and Alloy Steel Nuts
- D. ASTM A615 – Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- E. ASTM A615 – Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- F. ASTM A666 – Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
- G. ASTM A1064 – Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- H. ASTM C5 – Specification for Quicklime for Structural Purposes
- I. ASTM C90 – Specification for Loadbearing Concrete Masonry Units
- J. ASTM C91 – Specification for Masonry Cement
- K. ASTM C129 – Specification for Nonloadbearing Concrete Masonry Units
- L. ASTM C140 – Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units
- M. ASTM C144 – Specification for Aggregate for Masonry Mortar
- N. ASTM C150 – Specification for Portland Cement
- O. ASTM C207 – Specification for Hydrated Lime for Masonry Purposes
- P. ASTM C216 – Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)

- Q. ASTM C270 – Specification for Mortar for Unit Masonry
- R. ASTM C331 – Specification for Lightweight Aggregates for Concrete Masonry Units
- S. ASTM C404 – Specification for Aggregates for Masonry Grout
- T. ASTM C426 – Test Method for Linear Drying Shrinkage of Concrete Masonry Units
- U. ASTM C476 – Specification for Grout for Masonry
- V. ASTM C780 – Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
- W. ASTM C1019 – Standard Test Method for Sampling and Testing Grout for Masonry
- X. ASTM C1072 – Standard Test Method for Measurement of Masonry Flexural Bond Strength
- Y. ASTM C1314 – Standard Test Method for Compressive Strength of Masonry Prisms
- Z. ASTM D1970 – Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
- AA. ASTM E2178 – Standard Test Method for Air Permeance of Building Materials
- BB. ASTM E514 – Standard Test Method for Water Penetration and Leakage Through Masonry
- CC. BIA Technical Notes No. 7 – Water Penetration Resistance – Design and Detailing
- DD. TMS 402/602 – Building Code Requirements and Specification for Masonry Structures

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Provide data for each different masonry unit, fabricated wire reinforcement, mortar, accessories, and other manufactured product specified.
- C. Shop Drawings: Provide shop drawings for reinforcing steel showing bar sizes, bends, and dimensions.
- D. Information illustrating horizontal joint reinforcement.
- E. Grout proportions.
- F. Mortar proportions.
- G. Material certificates for the following, signed by Manufacturer and Contractor, certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 2. Each material and grade indicated for reinforcing bars.
- H. Samples:
1. One of each type of masonry to be used on Project
 2. Mortar colors for color selection.
- I. Informational Submittals:
1. Method of placing grout.
 2. Certified field test results within 5 days of performing specified tests.
 3. Certified test reports showing compliance with specified performance tests.
 4. Statement of acknowledgement of Quality Assurance Plan in accordance with IBC Section 1705.4
 5. Method and materials for removal of efflorescence.
- J. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, NCMA, and BIA, except where exceeded by the requirements of the contract documents.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum 5 years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least 5 years of documented experience.
- D. Mockups:
1. Layup sample panel for each type of masonry at Site.
 2. Dimensions: Minimum 4 feet high by 4 feet long.
 3. May be part of permanent construction.
 4. Approved panels shall serve as basis of color, texture, bond, quality of finished joints, and for acceptance of permanent construction.
 5. Demonstrate ability to keep insulation and grout isolated and in certain cells during any sequence of placement, and to demonstrate materials will be restricted to cells and bond beams intended to receive each material.

6. Construction shall show areas required to receive mortar, including webs on each side of each cell to prevent insulation from entering cells to receive grout or to prevent grout from entering cells to receive insulation.
 7. Where bond beams are to be used, demonstrate proper placement of both insulation and grout to bond beam level, and proper placement of bond beam prior to placement of insulation and grout above bond beam level.
 8. Demonstrate proper use of running bond.
- E. Comply with the requirements and criteria of the NCMA, BIA, ASTM C90, ASTM C216, and ACI 530.1 for masonry finish and appearance, dimension tolerances, tolerances of construction, joint tolerances, and plumb tolerances.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Storage and Protection: Keep lime and other ingredients dry.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Do not lay masonry when ambient temperature is below 40 degrees Fahrenheit on a rising temperature, or below 45 degrees Fahrenheit on a falling temperature, or when there is a probability of such conditions occurring within 48 hours, unless written approval of procedures for protection from freezing is obtained from Engineer.
- B. Moisture Protection: Protect masonry construction from loss of moisture during curing period of 7 days when ambient air temperature is 90 degrees Fahrenheit or greater and when relative humidity is less than 50 percent.

PART 2 - MATERIALS

2.1 COMPRESSIVE STRENGTH OF MASONRY

- A. Minimum 28 Day Compressive Field Strength (f'_m) of completed assemblage: 2,000 psi.

2.2 MATERIALS

- A. Concrete Block: ASTM C90 load bearing, kiln-dried, mediumweight block. Block face shall be smooth face as shown on the Drawings. Blocks shall be steam-cured, manufactured with lightweight aggregate conforming to ASTM C331. Scoria and tuff are not permitted for aggregate in the CMU block. Units to be tested per ASTM C426 with linear shrinkage of 0.065 percent or less. Protect from moisture at site. Moisture content of block when laid in final position shall not exceed 30 percent of total moisture absorption. Block sizes and widths as noted on Drawings. Color shall be as shown on the Drawings, or as specified by Owner.
- B. Compressive Strength: 2,000 psi minimum, in accordance with ASTM C90, Table 2

- C. Portland Cement: ASTM C150, Type I.
- D. Masonry Cement: ASTM C91, Type II.
- E. Mason's Sand: ASTM C144, except that not less than 4 percent or more than 10 percent shall pass the No. 100 sieve.
- F. Pea Gravel: ASTM C404 graded with not more than 5 percent passing the 3/8-inch sieve.
- G. Hydrated Lime: ASTM C207, Type S.
- H. Lime Putty: ASTM C5
- I. Water: Clean and potable, from domestic supply.
- J. Grout Admixture: Grace Concrete Products, "Zyla 630", "Daravair AT60", "Daracem 55", and "Recover", or equals.
- K. Steel Reinforcing: Deformed steel bars shall conform to ASTM A615, Grade 60.
- L. Horizontal joint masonry reinforcement shall be extra heavy, Hohmann & Barnard, 120 Truss-Mesh masonry wall reinforcing manufactured from wire conforming to ASTM A1064.
- M. Anchor Bolts: Steel bent bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A153, Class C.
- N. Expansion Anchors: One piece, three section wedge assembly of indicated sizes of stainless steel.
- O. Preformed Control Joints: Rubber material designed to fit sash block and to maintain lateral stability in masonry wall. Provide size and configuration as applicable to masonry width and conditions, fused joints.

2.3 CONCRETE BLOCK MORTAR AND GROUT PROPORTIONS

- A. Mortar: Type S consisting of one-part Portland Cement, 1/2-part lime putty, and 4 parts of Mason's sand by volume. Add only enough water to give mortar good working consistency. Mortar shall be used within 1/2 hour after mixing. Type S mortar shall have 1,800 psi minimum strength by compression test at 28 days. All mortar shall conform to ASTM C270.
- B. Masonry Grout: Grout shall be one-part Portland cement and three parts Mason's sand. Grout shall have 2,000 psi minimum strength by compression test at 28 days. Grout cores greater than 2-inch square may have two parts of 3/8 inch pea gravel added to the above. All grout shall conform to ASTM C476.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- C. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- D. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- E. Select and arrange units for exposed masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.

3.2 MIXING MORTAR AND GROUT

- A. General: Determine all parts of mortar and grout by reasonably accurate volume measurement and mix in a mechanical mortar mixer in batches containing not less than one full sack of cement, unless otherwise approved. When partial batches are mixed, use extreme care in measuring all parts.
- B. Order of Mixing: In mixing each batch of mortar or grout, mix the water, sand, and cement for not less than two minutes and until a smooth, plastic mass without lumps is obtained. Grout shall contain sufficient water to cause it to flow freely without segregation. Maintain mortar plastic and grout fluid continuously until used. Do not retemper or use mortar which has become harsh and non-plastic.

3.3 SETTING EMBEDDED ITEMS

- A. All anchor bolts and miscellaneous metal work embedded in masonry shall be set in accordance with setting plans or instructions furnished by trades supplying the metal work. Exercise care to ensure that all anchors are completely surrounded by grout.

3.4 INSTALLATION OF BLOCK

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and where possible, at other locations.

- B. The installation of concrete block shall be done using only mechanics skilled in the laying of masonry blocks. All necessary cutting of block on the job site shall be done with power tools in such manner to provide straight and true edges. No chipped or broken blocks shall be used. Lines shall be straight and true. Lay up concrete blocks in running bond in a full bed of mortar. Use channel blocks for lintels. Maintain alignment of cells containing reinforcement, remove projecting mortar and debris prior to grouting. Provide 3/8-inch joints, strike flush, and tool to smooth, concave, hard surface.
- C. Provide cleanout openings at bottoms of all cells to be filled at each lift or pour of grout where such lift is in excess of 4 feet in height. Any overhanging mortar or other obstruction or debris shall be removed from insides of such cell walls. The cleanouts shall be sealed before grouting, after inspection.
- D. All units shall be laid with full face shell mortar beds. All head and end joints shall be filled solidly with mortar for a distance in from the face of the unit equal to the full thickness of the face shell of the unit. Walls shall be erected plumb and in line.
- E. Except as shown on the Drawings, all joints shall be made approximately 3/8-inch-wide, cut flush, compressed, and firmly tooled to a tight, concave joint. Joints shall have full mortar coverage on vertical and horizontal faces as noted above. Vertical joints shall be shoved tight. Seal around all pipes or ducts and make airtight. Unless otherwise indicated, build in horizontal reinforcing every third course at all walls.
- F. Where required by the Drawings, and unless otherwise shown, all block walls shall have reinforcing bar steel set in vertical cell units and bonded with dowel steel which is to be set in the concrete foundation. Steel bars shall be centered and grouted solid into the cells of these units and lintels or bond beams.
- G. All reinforced hollow masonry unit shall be built to preserve the unobstructed vertical continuity of the cells to be filled. Walls and cross webs forming such cells to be filled shall be full bedded in mortar to prevent leakage of grout. All head (or end) joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells.
- H. Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear, unobstructed, continuous vertical cell measuring not less than 2 inches by 3 inches.
- I. Vertical reinforcement shall be held in position at top and bottom and at intervals not exceeding 192 diameters of the reinforcement.
- J. All cells containing reinforcement shall be filled solidly with grout. Vertical cells containing reinforcement shall be filled solidly with grout in lifts not exceeding eight feet in height. Where fully grouted walls are indicated on the plans, all reinforced cells and unreinforced cells shall be filled solidly with grout.
- K. When the grouting is stopped for one hour or longer, horizontal construction joints shall be formed by stopping the pour of grout 1-1/2 inches below the top of the uppermost unit.
- L. Protect finished Work from mortar stains. Remove excess mortar and mortar smears as work progressed. Clean immediately after completing adjacent masonry work.

- M. Interlock intersections and external corners.
- N. Contractor shall not erect masonry when ambient temperature has dropped below 45 degrees Fahrenheit unless it is rising, at no time when it has dropped below 40 degrees Fahrenheit, except by written permission. When masonry work is authorized during temperatures below 40 degrees Fahrenheit, make provisions for heating and drying materials; protect completed Work as per Structural Clay Products Institute, Technical Notes, Volume 1, Number 1. Do not build on frozen Work. Do not lay masonry having water film or frost on its surface. Do not lay masonry in the rain.

3.5 CONTROL JOINTS

- A. Preformed Control Joints:
 - 1. Omit mortar from vertical joints.
 - 2. Place rubber control joint material as wall is built.
 - 3. After wall is grouted, cured, and cleaned, install backing rod and sealant.
 - 4. Place and tool sealant to match depth of typical joint.

3.6 SHORING AND BRACING

- A. All concrete block lintel beams shall be adequately shored and braced before grouting in reinforcing. Shoring and bracing shall be left in place a minimum of 14 days after grouting beams. Do not place structural members or heavy loads on lintels without adequate shoring and bracing or until 28-day concrete strength is achieved.

3.7 PROTECTION

- A. Protect corners subject to possible damage. Protect block from moisture at site. Tops of all exposed open cells of block to be covered with waterproof material to prevent being filled with moisture. Protect all masonry from cold or frost. Ensure that mortar will harden without freezing. No anti-freeze ingredient shall be used in the mortar.
- B. During the progress of the project, and at the end of each day's work, the tops of all exposed open cell block shall be fully covered with heavy unruptured sheets of polyethylene and weighted down with heavy plank or other suitable materials. Under no circumstances shall the interior cells of the block be allowed to fill with snow or moisture.
 - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
 - 2. After completion of walls, protect top of wall until permanent wall caps are installed.
- C. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.
- D. Do not allow grout and mortar stains to dry on face of exposed masonry.

- E. Protect tops of walls at all times. Cover tops of walls with waterproof paper when rain or snow is imminent and when the Work is discontinued.
- F. Adequately brace walls until walls and roof are completed.
- G. Provide sufficient bracing to protect walls against damage from elements, including wind and snow.
- H. Protect masonry against freezing for minimum 72 hours after being laid.
- I. Protect masonry from damage until final acceptance of the Work. Damaged units will not be accepted.

3.8 CLEANING

- A. Clean off any mortar or grout stains on masonry work immediately. Any masonry showing stains from mortar, concrete, or grout at completion of Work shall be replaced. All imperfect jointing, chipped edges or corners, and similar defects shall be corrected or replaced.
- B. Upon completion of the Work, point up masonry, fill holes and joints, remove loose mortar, cut out defective joints, and repaint where necessary. Leave surfaces free from mortar and other stains at completion of Work.
- C. Replace defective mortar, match adjacent work.
- D. Clean and remove efflorescence from masonry with specified cleaners applied according to manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

- A. Special Inspection of masonry in accordance with OSSC Section 1705.4. Refer to Structural Drawings for Special Inspection Tables.
- B. Masonry shall be tested by and independent testing agency as indicated on the plans, in accordance with ASTM C1314, Method B, as modified by TMS 402/602. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- C. Masonry test prisms, when required, shall be constructed onsite with same materials and workmanship to be used for Project.
- D. Provide adequate facilities for safe storage and proper curing of masonry prisms, mortar samples, and grout samples, as applicable, onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
- E. Inspections:
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- F. Masonry Testing:
1. Unit Strength Method:
 - a. Method and frequency for mortar, grout, and masonry unit sampling and testing in accordance with OSSC 2105.1 and chapter 7 of TMS 402.
 - b. Provide masonry units for test samples required.
- G. Corrective Action:
1. If compressive strength tests made prior to construction of permanent structure fail to meet Specifications, adjustments shall be made to mix designs for mortar, or grout, or both, as needed to produce specified strength. Masonry units shall also be tested to verify compliance to requirements of ASTM C90, Type 1.
 2. If strength tests performed on materials representative of in-place construction fail to meet Specifications, prisms or cores shall be cut from constructed walls in sufficient locations to adequately determine strength in accordance with IBC 2105.3.
- H. Performance Test: Masonry using concrete masonry units and mortar with integral water repellent additives, and water repellent masonry sealer, shall achieve a Class E rating when evaluated in accordance with ASTM E514, with the test extended to 72 hours.

3.10 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4-inch.
- B. Maximum Variation from Unit to Adjacent Unit: 1/16-inch.
- C. Maximum Variation from Plane of Wall: 1/4-inch in 10 feet and 1/2-inch in 20 feet or more.
- D. Maximum Variation from Plumb: 1/4-inch per story non-cumulative; 1/2-inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8-inch in 3 feet and 1/4-inch in 10 feet; 1/2-inch in 30 feet.
- F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4-inch, plus 3/8-inch.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4-inch.

END OF SECTION 04 22 00

SECTION 04 26 16 – ADHERED MASONRY VENEER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install thin brick, adhesives, and accessories as shown on the Drawings and as specified herein.

1.2 REFERENCE STANDARDS

- A. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
- B. ASTM C1088 - Standard Specification for Thin Veneer Brick Units Made From Clay or Shale; 2020.
- C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2019.

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Provide data for thin brick units, mortar, grout, and adhesive.
- C. Samples: Submit four samples of thin brick units to illustrate color, texture, and extremes of color range.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

1.5 FIELD CONDITIONS

- A. Do not install adhesives in an unventilated environment.
- B. Maintain materials and surrounding air temperature to minimum 40 F prior to, during, and 48 hours after completion of masonry work.
- C. Maintain materials and surrounding air temperature to maximum 90 F prior to, during, and 48 hours after completion of masonry work.

PART 2 - PRODUCTS

2.1 THIN BRICK

A. Manufacturers:

1. Endicott Clay Products Co; ____: www.endicott.com/#sle.
2. General Shale Brick; ____: www.generalshale.com/#sle.
3. Meridian Brick LLC; ____: www.meridianbrick.com/#sle.
4. Metro Brick; ____: www.metrothinbrick.com/#sle.
5. Old Mill Brick, Inc; ____: www.oldmillbrick.com/#sle.

B. Thin Brick: ASTM C1088.

1. Type: TBX.
2. Size: Manufacturer's standard Modular.
3. Thickness: 5/8 inch.
4. Tolerances: 1/16 inch.
5. Color, Texture, Range, Special Shapes: As selected by Owner from manufacturer's standard range of colors, textures and blends.
6. Protective Coating: Wax.

2.2 ADHESIVE MATERIALS

- #### A. Basis of Design: Laticrete 15-year warranty Adhesive System, consisting of MVIS H=Bond Veneer Mortar; MVIS Premium Pointing mortar and Latasil Sealant. Similar complete systems by other manufacturers may be acceptable upon review and approval prior to bid.

B. Manufacturers, or Approved Equal:

1. LATICRETE International, Inc; LATICRETE MVIS Hi-Bond Mortar: www.laticrete.com/#sle.

2.3 FLASHINGS

- #### A. Metal Flashing Materials: Lead Coated Copper, as specified in Section 07 62 00.
- #### B. Plastic Flashings: Sheet polyvinyl chloride; 20 mil thick.
- #### C. Rubberized Asphalt Flashing: Self-adhering composite material comprising rubberized asphalt adhesive compound bonded to cross-laminated polyethylene film, minimum 0.030 inch total thickness.

- D. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

2.4 ACCESSORIES

- A. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
- B. Air and Water Barrier, (if noted on plans): Single component, fluid applied, vapor permeable; waterproofing, crack isolation, and air barrier membrane.
 - 1. Manufacturers:
 - a. LATICRETE International, Inc; LATICRETE MVIS Air & Water Barrier: www.laticrete.com/#sle.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive thin brick veneer.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for installation of thin brick veneer.

3.2 INSTALLATION

- A. Interior Applications: Comply with TCNA (HB) Method W211, W221, W222, W223, W231, W241, W242, W243, W244C, W244F, W245, W246, or W247.
- B. Exterior Applications: Comply with TCNA (HB) Method W201, W202, or W244E.

3.3 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.4 PLACING AND BONDING

- A. Remove excess mortar as work progresses.
- B. Interlock intersections and external corners, except for units laid in stack bond.
- C. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove and replace.
- D. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.5 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

3.6 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- C. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

3.7 CUTTING AND FITTING

- A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

3.8 CLEANING

- A. Clean soiled surfaces with cleaning solution.

END SECTION 04 26 16

SECTION 05 40 00 – COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install light gauge metal framing as shown on the drawings and specified herein.

1.2 SUBMITTALS

- A. General: Submit the following:
 - 1. Product data and installation instructions for each item of cold-formed metal framing and accessories.
 - 2. Shop drawings for framing members showing size and gauge designations, number, type, location, and spacing. Indicate supplemental strapping, bracing, splices, bridging, accessories, and details required for proper installation.

1.3 QUALITY ASSURANCE

- A. Welding: use qualified welder and comply with American Welding Society (AWS) D1.3, “Structural Welding Code -- Sheet Steel.”
- B. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide units that have been approved by governing authorities that have jurisdiction.

PART 2 - PRODUCTS

2.1 METAL FRAMING

- A. System Components: Manufacturer’s standard load-bearing steel studs and joists of type, size, shape, and gauge as indicated. With each type of metal framing required, provide manufacturer’s standard, steel tracks and reinforcements, fasteners, and accessories for applications indicated, as needed to provide a complete metal framing system.
- B. Materials and Finishes:
 - 1. For 16-gauge and heavier units, fabricate metal framing components of structural quality G60 galvanized steel sheet with a minimum yield point of [50,000] psi; ASTM A653, A1011, or A1008.
 - 2. For 18-gauge and lighter units, fabricate metal framing components of commercial quality G60 galvanized steel sheet with a minimum yield point of [33,000] psi; ASTM A653, A1011, or A1008.

3. Provide corrosion protection finish to metal framing components complying with ASTM A653, ASTM A792, or ASTM A875 for minimum CP60 coating.
4. Fasteners: Provide nuts, bolts, washers, screws, and other fasteners with corrosion-resistant plated finish.
5. Electrodes for Welding: Comply with AWS code and as recommended by stud manufacturer.
6. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A780.

2.2 FABRICATION

- A. General: Framing components may be prefabricated into assemblies before erection. Fabricate panels plumb, square, true to line, and braced against racking with joints welded. Perform lifting of prefabricated units to prevent damage or distortion.
- B. Fabricate units in jig templates to hold members in proper alignment and position and to assure consistent components placement.
- C. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with manufacturer.
- D. Wire tying of framing components is not permitted.
- E. Fabrication Tolerances: Fabricate units to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8-inch in 10 feet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install metal framing system in accordance with manufacturer's printed or written instructions and recommendations.
- B. Runner Tracks: Unless noted otherwise on plans, install continuous tracks with 1 1/4" vertical legs with size and gauge to match studs. Align tracks accurately to layout at base and tops of studs. Unless noted otherwise on plans, secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 16 inches on center spacing for nail or power-driven fastener. See plans for other types of attachment. Provide fasteners at corners and ends of tracks.
- C. Installation of Wall Studs: Secure to top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges.
- D. Unless noted otherwise on plans, at interior non-bearing walls where the top of the wall is attached to the structure, install a 16 gauge slotted deflection track with 3" vertical legs as manufactured by Cemco or an approved equal. Attach the deflection track to the structural roof or floor framing with (2) #12 screws at 24" OC maximum.

- E. Set studs plumb, except as needed for diagonal bracing or required for non plumb walls or warped surfaces and similar requirements.
- F. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
- G. Install supplementary framing, blocking, and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry with stud manufacturer's recommendations and industry standard in each case, considering weight of loading resulting from item supported.
- H. Frame wall openings larger than 2 feet square with double stud at each jamb of frame except where more than two are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs on wall. Secure stud system wall opening frame in manner indicated.
- I. Install horizontal stiffeners in stud system, spaced (vertical distance) at not more than 54 inches on center. Weld at each intersection.
- J. Erection Tolerances: Bolt or weld wall panels (at both horizontal and vertical junctures to produce flush, even, true-to-line joints.
 - 1. Maximum variation in plane and true position between prefabricated assemblies should not exceed 1/16 inch.
- K. Installation of Joists: Install level, straight, and plumb, complete with bracing and reinforcing as indicated on drawings. Provide not less than 1-1/2-inch end bearing.
- L. Reinforce ends with end clips, steel hangers, steel angle clips, steel stud section, or as otherwise recommended by joist manufacturer.

END OF SECTION 05 40 00



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SECTION 05 50 00 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install miscellaneous metal items as shown on the drawings and specified herein.
- B. Provide shop fabricated and manufactured stainless steel, steel and aluminum, including, but not limited to the following:
 - 1. Miscellaneous ledge angles, shelf angles, shapes, and plates not attached to structural framing.

1.2 STANDARDS

- A. AISC “Code of Standard Practice.”
- B. ANSI A14.3 – American National Standard for Ladders – Fixed – Safety Requirements
- C. ASTM A36 – Specification for Carbon Structural Steel
- D. ASTM A53 – Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- E. ASTM A153 – Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- F. ASTM A283 – Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
- G. ASTM A500 – Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- H. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- I. ASTM A786 – Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
- J. ASTM B209 – Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- K. ASTM B221 – Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles, and Tubes
- L. ASTM B429 – Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
- M. ASTM B663 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel

- N. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- O. ASTM D1187 – Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
- P. ASTM F1941 – Specification for Electrodeposited Coatings on Threaded Fasteners.
- Q. ASTM F3125 – Specification for High Strength Structural Bolts, Steel, and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength
- R. AWS D1.1 – Structural Welding Code – Steel
- S. AWS D1.2 – Structural Welding Code – Aluminum
- T. SSPC-SP 11 – Power Tool Cleaning to Bare Metal
- U. SSPC-SP 2 – Hand Tool Cleaning
- V. SSPC-SP 6 – Commercial Blast Cleaning

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Prepare shop drawings from field measurements where possible.
 - 2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- D. Welder's Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Ladders: Ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Quality procedures and personnel according to the following:
 - 1. AWS D1.1 – Structural Welding Code – Steel.

2. AWS D1.2 – Structural Welding Code – Aluminum

1.6 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in the General Structural Notes – Special Inspection Tables, will inspect installed shop fabricated and manufactured steel items for conformance to contract documents.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store and protect products with special custom wrapping and handling procedures to protect and touch-up shop primers at every stage of shipping.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturer's written recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 MATERIALS - STEEL

- A. HSS (Hollow Structural Shapes): ASTM A500 Grade B
- B. Bars, plates, miscellaneous shapes: ASTM A36
- C. Aluminum: Alloy 5052-H32, mill finish
- D. Welding Materials: AWS D1.1; type required for materials being welded.
- E. Shop and Touch-Up Primer for Galvanized Surfaces: Shall be as specified in Section 09 90 00 – Paintings and Coatings, complying with VOC limitations of authorities having jurisdiction.

2.2 MATERIALS – STAINLESS STEEL

- A. Bars, plates and miscellaneous shapes shall be ASTM A240 Type 304 or 316
- B. Fasteners: Provide Type 304 stainless-steel fasteners when attaching to Stainless steel members.
- C. Welding Materials: AWS D1.6 for stainless steel (Type 304 or 316); use type required for materials being welded.

2.3 MATERIALS – ALUMINUM

- A. Extruded Aluminum: ASTM B221, 6063 alloy, T6 temper, 6061 alloy, T6 temper, or 6005 alloy, T5 temper, as standard with manufacturer.
- B. Sheet Aluminum: ASTM B209, 5052 alloy, H32 or H22 temper, or 5005 alloy, H34 temper, as standard with manufacturer.

2.4 BOLTS AND ANCHORS

- A. Standard Service (Non-Corrosive Application): Unless otherwise indicated, bolts, anchor bolts, washers, and nuts shall be steel as indicated herein. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing. Except as otherwise indicated, steel for bolt material, anchor bolts and cap screws shall be in accordance with the following:

Structural Connections	ASTM A307, Grade A or B, hot-dip galvanized
Anchor Bolts	ASTM A307, Grade A or B, or ASTM A36, hot-dip galvanized

- B. Stainless steel bolts and nuts for corrosive service
 - 1. Corrosive Service: All bolts, nuts, and washers in the locations listed below shall be stainless steel as indicated below.
 - a. All buried locations.
 - b. All submerged locations.
 - c. All locations subject to seasonal or occasional flooding.
 - d. Inside hydraulic structures below the top of the structure.
 - e. Inside buried vaults, manholes, and structures which do not drain through a gravity sewer or to a sump with a pump.
 - f. All chemical handling areas.
 - g. Inside trenches, containment walls, and curbed areas.
 - h. Locations indicated by the Contract Documents or designated by the ENGINEER to be provided with stainless steel bolts.
- C. Bolt Requirements: The bolt and nut material shall be free-cutting steel. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

- D. Bolts and nuts shall be installed with washers fabricated of material matching the base material of bolts, except that hardened washers for high strength bolts shall conform to the requirements of the AISC Specification. Lock washers fabricated of material matching the bolts shall be installed where indicated.
- E. The length of each bolt shall be such that after the joint is made up, the bolt extends through the entire nut, but in no case more than 1/2-inch beyond the nut.
- F. Adhesive Anchors: Unless otherwise indicated, all drilled, concrete or masonry anchors shall be adhesive anchors. No substitutions will be considered unless accompanied with ICBO report verifying strength and material equivalency.
 - 1. Adhesive anchors are required for drilled anchors for indoor installations, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring reinforcing bars. Threaded rod shall be stainless steel Type 316. Epoxy adhesive shall be Hilti HIT RE 500 V3.
 - 2. Unless otherwise indicated, glass capsule, polyester resin adhesive anchors will be permitted in locations not included above and shall be Hilti HVA or Cobra Anchors. Threaded rod shall be galvanized steel.
- G. Expanding-Type Anchors: Expanding-type anchors if indicated or permitted, shall be galvanized steel expansion type ITW Ramset/Redhead "Trubolt" anchors; Hilti "Kwik-Bolt;" or equal. Lead caulking anchors will not be permitted. Size shall be as indicated. Embedment depth shall be as the manufacturer recommends for the load to be supported. Expansion type anchors which are to be embedded in grout may be steel. Non-embedded buried or submerged anchors shall be stainless steel.
- H. Overhead Applications: Use Hilti HDA undercut anchors.
- I. Miscellaneous Bolts and Nuts: ASTM A307
- J. High Strength Bolts and Nuts: ASTM F3125 Grade A325
- K. Concrete Anchors: Use cast in anchor bolts where cast in anchor bolts are shown on the drawings. Provide attachment to concrete with concrete anchors where shown on the drawings conforming to the following types. Use only type of concrete anchor shown on the drawings.
 - 1. Expansion Anchors: Expansion anchors shall be wedge type with a single piece three section wedge to anchor the stud in the hole. The stud nut and wedge shall be ANSI 304 stainless steel.
 - 2. Adhesive Anchors: Adhesive anchors shall be an all thread rod with a nut. The all thread rod and nut shall be ANSI 304 stainless steel. The rod shall be anchored in the hole using a premeasured adhesive capsule consisting of vinyl urethane methacrylate adhesive.

3. Undercut Anchors: Undercut anchors shall be an undercut style with a brazed tungsten carbide edge on the undercutting end to perform the self-cutting undercut as the anchor is installed. The anchor shall cut and undercut bearing area of at least 2.5 times the nominal anchor bolt size. The anchor stud shall be ANSI 316 stainless steel.

2.5 POWDER-DRIVEN PINS

- A. Power-driven pins to be installed in concrete or steel shall be heat-treated steel alloy. If the pins are not inherently sufficiently corrosion-resistant for the conditions to which they are to be exposed, they shall be protected in an acceptable manner. Pins shall have capped or threaded heads capable of transmitting the loads the shanks are required to support. Pins that are connected to steel shall have longitudinal serrations around the circumference of the shank. Complete information describing pin capacities, connections, and proposed use locations shall be submitted to the Engineer.

2.6 IMPACT ANCHOR

- A. Impact anchors shall be an expansion type anchor in which a nail type pin is driven to produce the expansive force. The pin shall have a zinc sleeve with a mushroom style head and stainless steel nail pin. Anchors shall be Metal HIT Anchors, manufactured by Hilti, Inc., Rawl Zamac Nailin, manufactured by the Rawlplug Company; or equal.

2.7 MISCELLANEOUS MATERIALS

- A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.
- B. Nonshrink, Metallic Grout: Factory packaged, ferrous-aggregate grout complying with ASTM C1107, specifically recommended by manufacturer for heavy-duty loading applications. Refer to Section 03 60 00 – Grouting for further requirements.

2.8 FABRICATION

- A. Workmanship: Conform to accepted shop practices. Form work true to details, with clean, straight, sharply defined profiles.
- B. Fit and shop assemble items in largest practical sections, for delivery to site. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- C. Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for intended use and, where applicable, to meet performance requirements.
- D. Fabricate items with joints tightly fitted and secured.
- E. Continuously seal joined members by continuous welds, unless otherwise indicated on Drawings.

- F. Joints and Connections: Weld all joints, unless other fastening methods are shown, specified or specifically approved. Close fit exposed joints; making joints where least conspicuous. Unless otherwise shown or specified, use flat and countersunk beaded bolts or screws in exposed connections.
- G. 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.
- H. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- I. Cutting, Drilling; Perform cutting, drilling, punching required for accurate fitting and assembly work. In addition, perform similar operations as required for attachment of work of other trades, provided that directions for such work are supplied prior to shop drawing approvals.
- J. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
 - 1. Provide anchor bolts for connecting to other work.
 - a. Drill and tap steel as required to receive bolted connections.
 - b. Make bolt holes 1/16-inch large than nominal bolt diameter.
- K. Provisions for Attachment to Structure: Furnish miscellaneous metal items complete with framing, supports, hangers, bracing, anchors, and other devices shown specified or necessary for reinforcement and proper, secure setting or attachment to building construction.
- L. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- M. Dissimilar Materials Protection: Insulate aluminum surfaces in contact with dissimilar metals, including galvanized steel and stainless steel, using chromate gasketing. Where aluminum is in contact with plaster or concrete, apply a heavy coat of alkali-resistant bituminous paint.
- N. Workmanship: Fabricate all items neatly and rigidly in accordance with details in first-class finished, workmanlike manner. Form curved work neatly to radii indicated. Provide members of sizes indicated and weld, bolt or rivet securely together. Furnish bolts, nuts, washers, and other fastening devices required for anchoring and securing work.
- O. Welding: Use electric shielded-arc process in accordance with Welding Specifications of American Welding Society. Use only welding operators properly trained and highly skilled in arch welding. Grind smooth surface welds exposed to view.

2.9 SHOP FINISHING

- A. Steel Metal Items: Galvanize all iron or steel items. Prior to galvanizing, all items after fabrication shall be cleaned thoroughly, removing scale, flux deposits, rust, oil, dirt, and other foreign matter. Except as otherwise indicated, iron or steel items specified to be galvanized shall be hot-dip galvanized after fabrication in accordance with ASTM A123. Fabricate units complete or in largest practical sections before galvanizing.
- B. Aluminum Metal Items: Aluminum guardrail and handrails shall be finished with a 0.7 mil clear anodized finished, unless noted otherwise. All structural aluminum elements such as beams, columns, ledgers, structural connectors, all stair framing elements, including treads, and hand and guard rails, shall be anodized.

2.10 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking, joists, and masonry; prime paint finish.
- B. Lintels: As detailed, galvanized finish.
 - 1. Size loose lintels to provide bearing length at each side of opening equal to 1/10 of clear span but not less than 8 inches, unless otherwise indicated.
- C. Door Frames for Overhead Door Openings: Channel sections, prime paint finish, unless otherwise indicated.
- D. Overhead Door Supports: Fabricate supports for overhead doors from steel of sizes and shapes recommended by door manufacturer and with attached anchors as recommended by door manufacturer.

2.11 FINISHES – STEEL

- A. Galvanizing and prime paint all exterior steel items.
- B. Prime paint all steel items.
 - 1. Exceptions: Galvanized items to be embedded in concrete and items to be embedded in masonry.
- C. Prepare surfaces to be primed in accordance with SSPC-SP 2 where indicated to receive manufacturer's standard primer.
- D. Prepare surfaces to be primed in accordance with SSPC-SP 6 where indicated to receive high-performance coating finish.
- E. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- F. Prime Painting: One coat of specified primer applied in strict accordance with primer manufacturer's instructions.
 - 1. Provide one coat of manufacturer's standard primer for the following items:

a. Interior ladders.

- G. Galvanizing: Galvanize after fabrication to ASTM A123 requirements.

2.12 FINISHES – ALUMINUM

- A. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).

2.13 FABRICATION TOLERANCES

- A. Squareness: 1/8-inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16-inch.
- C. Maximum Misalignment of Adjacent Members: 1/16-inch.
- D. Maximum Bow: 1/8-inch in 48 inches.
- E. Maximum Deviation from Plane: 1/16-inch in 48 inches.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Clean and strip primed steel items to bare metal where site welding is required.
- C. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.
- D. Embedded Items: Deliver miscellaneous metal items to be embedded or installed in concrete with setting instruction to concrete contractor for setting. Verify grade and line positioning of items as set, report errors or deviations in order that corrective adjustments may be made before placement of concrete or laying of masonry.
- E. Coat all aluminum surfaces in contact with concrete with an approved bituminous coating or zinc chromate primer.

3.2 GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, thru bolts, lag screws, wood screws, and other connectors.

- C. Concrete Anchors: Install concrete anchors in cast in place concrete and masonry according to the details shown on the drawings and as recommended by the anchor manufacturer. When installing concrete anchors in masonry always install anchors in masonry cells that have been grouted solid. Do not install anchors into hollow cell masonry.
- D. Install items plumb and level, accurately fitted, free from distortion or defects.
- E. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- F. Field weld components as indicated.
- G. Perform field welding in accordance with AWS D1.1
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- H. Obtain approval prior to site cutting or making adjustments not scheduled.
- I. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- J. Expansion, Contraction: Assemble and install work with adequate provisions to prevent objectionable distortion and overstressing from expansion, contraction. Where necessary, provide properly designed expansion joints, construct to be weather tight if to be exposed to the weather.
- K. Field Touch-up: After installation of miscellaneous metal items, touch-up field bolts, field welds, uncoated connections and abrasions with shop protective coatings. Clean items of mud, dirt, and other objectionable foreign matter.
- L. Finishing: Where indicated, metal fabrication items shall be painted after installation in accordance with Section 09 90 00 – Painting and Coating.

3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturer's written instructions and requirements indicated on Shop Drawings.

3.4 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.
 - 1. Clean surfaces of weld seams according to SSPC-SP 11, "Power Tool Cleaning to Bare Metal".

3.6 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset from True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch

END OF SECTION 05 50 00



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SECTION 05 51 19 – METAL GRATING STAIRS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, materials and equipment as required to install metal grating stairs as shown on the Plans. Coordinate Work with other contractors.

1.2 STANDARDS

- A. 2025 Oregon Structural Specialty Code
- B. AISC “Code of Standard Practice.”
- C. AWS “Code for Welding in Building Construction.”

1.3 SUBMITTALS

- A. Submit Shop Drawings and product data in accordance with Section 01 33 00 – Submittal Procedures
- B. Shop Drawings: Prepare and submit shop drawings for handrail, grating, stringers and miscellaneous metal items prior to fabrication. Identify items with location and drawing or specifications reference. Layout drawings for grating shall be submitted showing the direction of span, type and depth of grating and details of grating hold down fasteners. Load and deflection table shall be submitted for each style and depth of grating used. Show connections, anchors, anchor or fastener spacing dimensions and details. Submit design calculations for all grating shop drawings stamped by a professional engineer in the State where Work is to be done.
- C. Welders’ Certificates
- D. Fabricator’s Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Handrails: Comply with applicable accessibility requirements of ADA Standards and in accordance with Section 05 52 00 – Metal Railings.

2. Dimensions: As indicated on the drawings.
3. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
4. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
5. Separate dissimilar metals using paint or permanent tape.
6. Welded Joints: Welded on backside wherever possible.
7. Welds Exposed to View: Ground smooth.
8. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts or screw threads.
9. Metal Surfaces to be Painted: Sanded smooth, suitable for satin or matte finish.
10. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
11. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.2 STAIR TREADS

- A. Provide steel treads where steel stairs are shown on the drawings and provide aluminum treads where aluminum stairs are shown on the drawings.
 1. Steel Stair Treads: Provide welded steel rectangular bar grating type stair treads. Bearing bars shall be 1-1/2 inch deep and 3/16 inch wide with serrations on the top side of the bearing bars. The nose of the tread shall have an abrasive cast iron nosing attached to the tread. The width and length of the tread shall be as detailed on the drawings.
- B. Load/Deflection Requirements: Treads shall be capable of spanning the distances indicated with a minimum safety factor of 3 for all stresses and without exceeding a deflection equal to the lesser of 1/4 inch or the span divided by 180. The loading used for determining stresses and deflections shall be the uniform live load of the adjacent floor area or 100 pounds per square foot, whichever is greater, and/or a concentrated load of 300 pounds at the center of the span, whichever is greater unless otherwise indicated.

2.3 BEAMS, COLUMNS AND MISCELLANEOUS FRAMING

- A. Provide steel beams, columns and miscellaneous framing as indicated on the drawings. Unless noted otherwise on the drawings use the following beams, columns and miscellaneous framing materials.

1. Plates and structural shapes shall be ASTM A36 unless noted otherwise
2. HSS columns shall be ASTM A500, Grade B unless noted otherwise.

2.4 HANDRAILS AND GUARDS

- A. Provide handrails and guards where required by Code and where shown on the drawings and in accordance with Section 05 52 00 – Metal Railings. Provide steel handrails and guards where shown on the drawings and provide aluminum handrails and guards where shown on the drawings.
- B. Guards:
 1. Top Rails: Round pipe rails unless otherwise indicated.
 - a. Outside Diameter: 1.90 inches.
 - b. Wall thickness as indicated on plans.
 - c. Material: Steel pipe or tube, round conforming to ASTM A53 Grade B.
 2. Infill at Pipe Railings: Pipe rails sloped parallel to stairs.
 - a. Outside Diameter: .90 inches.
 - b. Wall thickness as indicated on plans.
 - c. Material: Steel pipe or tube, round conforming to ASTM A53 Grade B.
 - d. Vertical Spacing: Maximum 13 inches on center.
 - e. Jointing: Welded and ground smooth and flush.
 3. End and Intermediate Posts: Round pipe posts unless otherwise indicated .
 - a. Outside Diameter: 1.90 inches.
 - b. Wall thickness as indicated on plans.
 - c. Material: Steel pipe or tube, round conforming to ASTM A53 Grade B.
 - d. Horizontal Spacing: As indicated on drawings.
 - e. Mounting: Welded to top surface of stringer or landing beam unless indicated otherwise on plans.

2.5 METAL GRATING

- A. Metal grating shall be of the design, sizes, and types indicated on plans and in accordance with Section 05 53 00 – Metal Grating and Floor Plates. Grating shall be completely banded at all edges and cutouts using material and cross section equivalent to the bearing bars. Such banding shall be welded to each cut bearing bar. Grating shall be supported on all sides of an opening by support members.

2.6 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop and touch up primer.
 - 1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning, one coat.
- D. Galvanizing: Hot-dip galvanized to minimum requirements of ASTM A123.
 - 1. Galvanize all iron or steel items. Prior to galvanizing, all items after fabrication shall be cleaned thoroughly, removing scale, flux deposits, rust, oil, dirt, and other foreign matter. Fabricate units complete or in largest practical sections before galvanizing.
 - 2. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.
 - 3. Paint over galvanized surfaces with a 70 micrometer, minimum, painted finish. Prepare surfaces per the manufacturer's recommendations with color to be selected by the owner.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install gratings and stairs as shown on the Plans.
- B. When field welding is required, clean and strip primed steel items to bare metal.
- C. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.2 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

- C. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1.
- D. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- E. Obtain approval prior to site cutting or creating adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.3 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset from True Alignment: 1/4 inch.

END OF SECTION 05 51 19



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SECTION 05 52 00 –METAL RAILINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, materials and equipment as required to install all pipe and tube handrails, balusters, and fittings, as shown on the Plans.

1.2 REFERENCE STANDARDS

- A. ADA Standards – Americans with Disabilities Act (ADA) Standards for Accessible Design
- B. ASTM A53 – Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- C. ASTM A123 – Specification for Zinc (Hot-Dip, Galvanized) Coatings on Iron and Steel Products
- D. ASTM A500 – Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- E. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- F. ASTM B429 – Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
- G. ASTM C1107 – Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink)
- H. AWS D1.1 – Structural Welding Code – Steel
- I. AWS D1.3 – Structural Welding Code – Sheet Steel
- J. OSSC – Oregon structural Specialty Code
- K. OSHA Safety Requirements.
- L. SSPC-PA-1 – Shop, Field, and Maintenance Painting of Steel
- M. SSPC-SP 1 – Solvent Cleaning
- N. SSPC-SP 11 – Power Tool Cleaning to Bare Metal
- O. SSPC-SP 6 – Commercial Blast Cleaning

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

- B. Shop drawings: Indicate profiles, railing layouts, post locations, and gate locations. Indicate component details, materials, finishes, connection and joining methods, attachment to supporting structure, and the relationship to adjoining work.
 - 1. Submit design calculations for all handrail and guardrail shop drawings stamped by a professional engineer in the State where Work is to be done.
 - 2. Submit design calculations for anchorage of railing stamped by a professional engineer in the State where Work is to be done.
- C. Submit manufacturer's instructions for installation and connecting methods.
- D. Samples: Submit color samples for Owner review and approval.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Quality procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code – Steel".
 - 2. AWS D1.3, "Structural Welding Code – Sheet Steel".

1.5 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturer's written recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 RAILINGS – GENERAL REQUIREMENTS

- A. Allow for expansion and contraction of members and building movement without damage to connections or members.
- B. Dimensions: See drawings for configurations and heights.
- C. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated.

2.2 STRUCTURAL PERFORMANCE

- A. Code Requirements: All railings, guardrails and handrails shall conform to the code requirements for OSCC and the State-approved OSHA. Railings, guardrails, and handrails, when part of the means of egress as defined by the governing codes, shall conform to the requirements of the most stringent of the codes or reference standards. All areas of the project shall conform to the code and State-approved OSHA for industrial-commercial, non-public use unless otherwise indicated.

2.3 STEEL MATERIALS

- A. Steel Tube: ASTM A500, Grade B cold-formed structural tubing.
- B. Steel Pipe: ASTM A53 – Grade B Schedule 40.
- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- D. Exposed Fasteners: No exposed bolts or screws.
- E. Galvanizing: in accordance with requirements of ASTM A123.
 - 1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.
 - 2. Galvanize all exterior members.
- F. Non-Shrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 RAILING SYSTEM

- A. Rail Section: Railing and handrails shall be round pipe design railing system unless otherwise indicated. Provide three (3) rails plus metal kickplate.
- B. Rail and Post: Pipe rail shall be not less than 1-1/2-inch diameter, Schedule 40 pipe. Pipe Post shall be not less than 1-1/2-inch diameter, Schedule 80 pipe.
- C. Fasteners: Fasteners, screws, and bolts shall be of stainless steel or aluminum. Handrail bracket fasteners and fasteners over water basins shall be stainless steel.
- D. Brackets: Handrail brackets shall match the material and finish of the handrail or railing of which they are a part.
- E. Toeboards: Toeboards shall be extruded (match railing system) steel of not less than 4-inches in height. Toeboards for pipe railing shall be channel section for strength.

2.5 FINISHES

- A. Pipe railing system includes handrails, railing, tube caps, and other miscellaneous parts of rails shall be hot dipped galvanized per ASTM A123 with a 70 micrometer, minimum, painted finish. Prepare surfaces per the manufacturer's recommendations with color to be selected by the owner

2.6 MANUFACTURERS OR EQUAL

- A. “C-V Pipe Rail” by CraneVeyor Corp.
- B. “Wesrail” by Moultrie Manufacturing Co.

2.7 FABRICATION

- A. Verify dimensions on site prior to shop fabrication. Fit and shop assemble sections in largest practical sizes for delivery and installation at site.
- B. Accurately form components to suit specific project conditions and for proper connection to building structure
- C. Supply components required for secure anchorage or handrails and railings.
- D. Welded Joints:
 - 1. Interior components: Continuously seal joined pieces by continuous welds.
 - 2. Grind exposed joints flush and smooth with adjacent surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Fit and shop assemble components in largest practical sizes for delivery to site.
- F. Galvanize and paint all iron or steel items. Prior to galvanizing, all items after fabrication shall be cleaned thoroughly, removing scale, flux deposits, rust, oil, dirt, and other foreign matter. Except as otherwise indicated, iron or steel items specified to be galvanized shall be hot-dip galvanized after fabrication in accordance with ASTM A123. Fabricate units complete or in largest practical sections before galvanizing. Paint using a 70 micrometer, minimum, painted finish. Prepare surfaces per the manufacturer's recommendations with color to be selected by the owner.

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken packages, containers, or bundles bearing the label of the manufacturer.
- B. Storage: All materials shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.

3.2 PREPARATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Supply items to be mounted to concrete, embedded in masonry, or place in partitions with setting templates and erection drawings to appropriate sections.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

- C. Anchor hand railings securely to structure. Install in accordance with shop drawings, approved anchorage calculations, and manufacturer's instructions.
- D. All exposed welds shall be ground smooth and flush and shall be polished and anodized. Discoloration on exposed metal surfaces, whether or not due to welding, shall constitute a basis for rejection of the entire assembly.
- E. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated. Plumb posts in each direction.
- F. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780.
 - 1. Clean surfaces of weld seams according to SSPC-SP 11, "Power Tool Cleaning to Bare Metal".

3.4 TOLERANCES

- A. Maximum Variation from Plumb: 1/4-inch per floor level, non-cumulative.
- B. Maximum Offset from True Alignment: 1/4-inch.
- C. Maximum Out-of-Position: 1/4-inch.

END OF SECTION 05 52 00



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SECTION 05 53 00 – METAL GRATINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, materials and equipment as required to install all grating, floor plates and seats, as shown on the Plans. Coordinate Work with other contractors.
- B. Furnish seats for all grating and floor plates, as shown on the Plans.

1.2 SUBMITTALS

- A. Shop Drawings: Shop Drawings of all miscellaneous metalwork shall be submitted in accordance with Section 01 33 00 – Submittal Procedures.
- B. Prior to ordering or fabrication of grating, floor plates, or seats, submit shop drawings of all pieces with positioning diagram to the Engineer for approval. Layout drawings for grating shall be submitted showing the direction of span, type and depth of grating, size and shape of grating panels, seat angle details, and details of grating hold down fasteners. Load and deflection table shall be submitted for each style and depth of grating used. Submit design calculations for all drawings stamped by a professional engineer licensed in the State where Work is to be done.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Dissimilar Materials Protection: Insulate aluminum surfaces in contact with metals other than galvanized or stainless steel, or with plaster or concrete, by means of chromate gasketing or heavy coat of alkali-resistant bituminous paint.
- B. Load/Deflection Requirements: Grating shall be capable of spanning the distances indicated with a minimum safety factor of 3 for all stresses and without exceeding a deflection equal to the lesser of 1/4 inch or the span divided by 180. The loading used for determining stresses and deflections shall be the uniform live load of the adjacent floor area or 100 pounds per square foot, whichever is greater, and/or a concentrated load of 1000 pounds at the center of the span, whichever is greater unless otherwise indicated.
- C. Design: All grating shall be of modular construction, capable of being removed in sections for inspection or to gain access to the structure below. Each operation shall not weigh more than 80 pounds and shall be provided with a 316 stainless steel or Aluminum lifting handles.

2.2 METAL GRATING,

- A. Provide steel grating where steel grating is shown on the drawings.

1. Unless noted otherwise on plans where steel grating is specified, provide galvanized steel rectangular welded steel non-slip bar grating. Bearing bars shall be 1-1/2" deep and 3/16" wide. Spacing of bearing bars shall be 1-3/16".
- B. Metal grating shall be of the design, sizes, and types indicated. Grating shall be completely banded at all edges and cutouts using material and cross section equivalent to the bearing bars. Such banding shall be welded to each cut bearing bar. Grating shall be supported on all sides of an opening by support members.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install gratings as shown on the Plans.
- B. Workmanship: Fabricate all items neatly and rigidly in accordance with details in first-class finished, workmanlike manner. Form curved work neatly to radii indicated. Provide members of sizes indicated and weld, bolt or rivet securely together. Furnish bolts, nuts, washers, and other fastening devices required for anchoring and securing work.
- C. Galvanizing: Galvanize all iron or steel items. Prior to galvanizing, all items after fabrication shall be cleaned thoroughly, removing scale, flux deposits, rust, oil, dirt, and other foreign matter. Except as otherwise indicated, iron or steel items specified to be galvanized shall be hot-dip galvanized after fabrication in accordance with ASTM A123. Fabricate units complete or in largest practical sections before galvanizing.

END OF SECTION 05 53 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, materials and equipment as required to construct all rough carpentry work, which is generally not exposed and is covered by finish work.

1.2 REFERENCES STANDARDS

- A. AWC (WFCM) – Wood Frame Construction Manual for One and Two-Family Dwellings
- B. APA PRP-108 – Performance Standards and Qualification Policy for Structural-Use Panels (Form E445)
- C. ASTM A153 – Specification for Zinc-Coating (Hot-Dip) on Iron and Steel Hardware
- D. ASTM A653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process
- E. ASTM D2898 – Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
- F. AWPA U1 – Use Category System: User Specification for Treated Wood
- G. IBC – International Building Code
- H. NFPA – National Design Specification for Stress Grade Lumber and its Fastenings
- I. PS 1 – Structural Plywood
- J. ASTM D3498 or APA AFG-01 – Subfloor Construction Adhesive
- K. PS 2 – Performance Standard for Wood-Based Structural-Use Panels
- L. PS 20 – American Softwood Lumber Standard
- M. WCLIB (GR) – Standard Grading Rules for West Coast Lumber No. 17
- N. WWPA G-5 – Western Lumber Grading Rules
- O. ANSI 135.4 – Basic Hardboard

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

- B. Product Data: Provide technical data on wood preservative materials and application instructions.
 - 1. For composite-wood products, provide documentation indicating that product contains no urea formaldehyde.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber Materials
 - 1. General: Factory mark each piece of lumber with type, grade, mill and grading agency.
 - 2. Species: See General Structural Notes in Drawings.
 - 3. Provide dimensioned lumber as required by PS 20.
 - 4. Use S4S lumber, unless otherwise indicated.
 - 5. Use seasoned lumber with 19 percent maximum moisture at time of use.
 - 6. Unless noted otherwise on plans, use No. 2 grade Douglas Fir or Larch, or any species and grade meeting the following requirements, unless otherwise noted; see General Structural Notes in Drawings:
 - a. Fb: 900 psi minimum
 - b. E: 1,600,000 psi minimum
- B. Pressure-Treated Lumber: All wood nailing blocks, sills, and plates resting on or embedded in concrete or masonry within 18 inches of grade shall be pressure-treated in accordance with AWPA C1. Preservative shall conform to American Wood Preservers Assn. and American Wood Preservers Bureau Standard Specifications. Creosote shall not be used.

2.2 PLYWOOD MATERIALS

- A. Plywood: Plywood shall conform to the requirements of U.S. Product Standard PS-1 as specified herein. All plywood panels shall be marked with grade mark of the American Plywood Association. The mark shall identify the plywood as to species, glue type, and grade in compliance with the applicable commercial standard. Plywood shall be Douglas Fir, Exterior, C-D, S1S.

- B. Hardboard: Hardboard shall be temper-treated panels manufactured from interfelted ligno-cellulose fibers consolidated under heat and pressure in a hot press to produce a smooth, hard-surfaced material which is resistant to water and stains. Hardboard shall conform to the requirements of ANSI/AHA A 135.4.
- C. Oriented Strand Board (OSB): Where shown on Plans, OSB shall conform to American Plywood Association Sturd-I-Floor and conform to the Council of American Building Officials NER 108. Use edge sealed tongue and groove OSB for flooring. Use glue nail application approved by the American Plywood Association for Sturd-I-Floor construction

2.3 ACCESSORIES

- A. Nails: Galvanized for exterior locations, high humidity locations; plain finish for other interior locations; size and type to suit application.
- B. Screws, Simpson SDWS screws or an approved equal.
- C. Subfloor Construction Adhesive, shall be continuously glued to all wood floor framing with a subfloor construction adhesive that meets ASTM D3498 or APA AFG-01
- D. Bolts, Nuts, Washers, Lags and Screws: Medium carbon steel; size and type to suit application; galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations.
- E. Fasteners: Expansion shield and lag bolt type for anchorage to concrete. Bolts or power activated type for anchorage to steel.
- F. Metal Framing Devices: Provide metal framing devices as shown on the Drawings. Acceptable products include "Strong-Tie" by Simpson Company, Silver Metal Products, or equivalent by approval.
- G. Plyclips shall be extruded aluminum clips, manufactured from 6063-T6 aluminum alloy, and designed for intended use. Size shall be as required for plywood or shall be as shown.

PART 3 - EXECUTION

3.1 GENERAL

- A. Discard units of material with defects which might impair quality of Work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- B. Set carpentry work accurately to required levels and lines with members plumb and true and accurately cut and fitted.
- C. Securely attach carpentry work to substrate by anchoring and fastening as shown, and as required by recognized standards. Countersink nail heads and fill holes in exposed carpentry work.

- D. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood and pre-drill as required.
- E. Rough Hardware: All rough hardware not otherwise specified and which is necessary for the satisfactory execution of framing, including nails, spikes, dowels, fasteners, and similar incidentals shall be provided and installed by the Contractor. Rough hardware shall be coordinated, furnished, installed, and embedded as shown and as required for a complete Work.
- F. Framing: Framing members and assemblies shall be closely fitted, accurately set, and rigidly secured to required lines, levels, and arrangements shown. Framing shall be accurately and neatly cut and shall be securely nailed, spiked, or otherwise fastened in place in a workmanlike manner. Timber connectors and installation thereof shall conform to applicable requirements of AITC 104 and AITC 105.

3.2 INSTALLATION – GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including shims, bracing, and blocking.

3.3 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWI (WFCM) Wood Framing Construction Manual.
- E. Install horizontal spanning members with crown edge up and not less than 1-1/2-inches of bearing at each end.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise specified.
- G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.
- H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs. See structural details for further information.

3.4 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. Plate and Sill Installation to foundation system: Bottom plates shall be pressure treated and sill plates which are secured to concrete shall be located as shown. The anchor bolts, (1/2" diameter with 7" minimum embedment @ 32" OC unless noted otherwise on plans) shall be located as shown or as required by Referenced Standard if not shown. The plates and sills shall be leveled with shims. Provide 2x2x3/16" plate washers shall be provided at each anchor and nuts shall be tightened to level bearing, after which the spaces (1/2-inch minimum) between the sill and concrete shall be dry packed with concrete.
- C. Blocking and Backing: All blocking and backing in walls and ceilings shall be nominal 2-inch-thick material of a depth as needed and shall be accurately located around light fixtures, ceiling registers, grilles, and other required mechanical and electrical items. The blocking shall fit snugly and shall be spiked into the supporting framing members. Wood blocking (backing) to receive sheathing, siding, metal lath, and gypsum board shall be provided wherever necessary for securing the facing materials.
- D. Plywood Sheathing: Plywood sheathing shall be installed with face grain across supports and end joints shall be over joists and shall be staggered. Blocking shall be provided at all unsupported edges.
- E. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- F. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- G. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
 - 1. Provide 1-inch thick AC, fire-resistive plywood 12 inches by stud width for door hardware, toilet accessories, hand towel and soap dispensers.
- H. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- I. Fire Stops: Fire stops shall be not less than 2-inch nominal thickness and of the same width as the studs. Strips of full-thickness fiber glass or rock wool shall be installed around pipes, ducts, conduits, and other penetrations through fire stops.

3.5 FRAMING DEVICES

- A. Metal Framing Devices: Metal framing devices shall be furnished and installed where shown. Nails for the framing devices shall be as furnished or recommended by the manufacturer of the anchor device. All nails shall be driven to their full depth at all holes in anchors. Bolt and lag fasteners shall be drawn tight.

3.6 INSTALLATION OF PANELS

- A. Roof Nailers and Fascia Backing: Secure panels with long dimension perpendicular to framing members with ends staggered and over firm bearing.
- B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. Provide a 1/8-inch space between panel edge and end joints to allow for expansion.
 - 2. Follow sheathing schedule in the Drawings for nailing patterns, staples are not permitted.
- C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered.
 - 1. Protect sheathing from moisture. Do not cover wet sheathing materials. Remove and replace wet materials.
 - 2. Provide a 1/8-inch space between panel edge and end joints to allow for expansion.
- D. Floor Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. Provide a 1/8-inch space between panel edge and end joints to allow for expansion.
 - 2. Follow sheathing schedule in the Drawings for attachment patterns.

3.7 TOLERANCES

- A. Framing Members: 1/4-inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4-inch in 10 feet maximum, and 1/4-inch in 30 feet maximum.

END OF SECTION 06 10 00

SECTION 06 17 53 – SHOP - FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Finish and install wood roof trusses as indicated on the Drawings and as specified herein.

1.2 SUBMITTALS

- A. Shop Drawings: Contractor shall submit shop drawings for approval showing complete details of wood trusses. Show the following information:
 - 1. Design and fabrication data.
 - 2. Thickness, nominal sizes and location of metal connectors at all joints.
 - 3. Pitch span and spacing of trusses.
 - 4. Species and stress grades of lumber to be used as members.
 - 5. Design loading of trusses and allowable stress increase.
 - 6. Force analysis in each member.
 - 7. Any bracing required to prevent compression buckling of truss members.
 - 8. Camber and deflection.
 - 9. Final truss plans shall be stamped by a registered Professional Engineer licensed in the State where the Work is to be done.

1.3 QUALITY ASSURANCE

- A. Standards: The design and fabrication of wood trusses shall comply with the following standards latest edition:
 - 1. "National Design Specifications for Stress-Grade Lumber and Its Fastenings" by NFPA.
 - 2. "Timber Construction Standards" by AITC.
 - 3. "Design Specifications for Light Metal Plate Connected Wood Trusses" by Truss Plate Institute.

1.4 DESIGN STANDARDS

- A. The truss manufacturer is responsible for the design and fabrication of the truss system and its bracing requirements.

- B. Trusses, truss hangers and truss connectors shall be designed as deferred submittal. The truss manufacturer shall submit truss calculations along with all truss hangers and connectors sealed by a engineer registered in the state of Oregon for review and approval prior to fabrication. Trusses shall be designed to support the loads indicated on the plans.

(See General Structural Notes - Basis of Design and framing plans, on Construction Drawings for Additional Loading Requirements, I.E. Wind, Seismic and Importance Factors)

- C. Truss design shall conform to the requirements of the current edition of OSSC Chapter 12 and ASCE 7 Section 7. These requirements shall include, but are not limited to, the following:

1. Partial loading.
2. Unbalanced snow loads.
3. Drifts on lower roofs and roof projections.
4. Sliding snow.
5. Ice dams and Icicles along eaves (double eave loads).
6. Wind Loading
7. Deflection

- D. The truss manufacturer shall consider the effects of eccentric loading in the design of heel joints.

- E. No stress increase for plate connectors will be allowed.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Fabricated trusses shall be handled with care so that they are not subject to damage. If trusses are stockpiled prior to erection, they shall be set in vertical position, resting on temporary supports, and braced to prevent unusual bending or tipping over.

PART 2 - PRODUCTS

2.1 MATERIALS OF CONSTRUCTION

- A. All lumber used for the truss members shall be Douglas Fir Dense No. 1 Grade. All lumber used for truss members shall conform to the published stress ratings for the species and grades as set out in the official grading rules of the Lumber Association.

1. Moisture content of lumber shall not exceed 19 percent nor be less than 7 percent at the time of fabrication.
2. Lumber shall be uniformly sized S4S and conform to the nominal sizes shown on the shop drawings.

3. All members shall be cut from lumber which bears the proper grademarks stamp of a recognized grading association.

2.2 CONNECTORS

- A. All truss connector plates shall be fabricated from galvanized sheet steel which has minimum uncoated thickness of 0.0359 inches 20 gauge and a minimum yield strength of 33,000 psi. Corrosion-resistant coating shall be 1.25 oz. per square foot commercial class hot-dipped galvanized.
- B. Truss hangers shall be manufactured by Simpson Strong Tie or an approved equal

2.3 FABRICATION

- A. Trusses shall be fabricated in a properly equipped manufacturing facility. They shall be manufactured by experienced workmen using proper truss fabricating equipment.
- B. Truss members shall be accurately cut to length, angle and be true to line to assure tight joints in finished trusses.
- C. Truss members and connector plates shall be properly placed in special jigs and the members tightly clamped in place until the connector plates have been pressed into the lumber simultaneously on both sides of the joints.

PART 3 - EXECUTION

3.1 ERECTION

- A. During erection, care shall be taken to keep horizontal bending of the trusses to a minimum.
- B. Proper erection bracing shall be installed to hold the trusses true and plumb until the permanent truss bracing system is solidly nailed in place.
- C. Erection of permanent bracing shall be installed before application of any loads.

END OF SECTION 06 17 53



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SECTION 06 40 00 – ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install casework, cabinetry and finish trim work as shown on the drawings and specified herein.

1.2 SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 – Submittal Procedures.
- B. Shop drawings for the casework and cabinetry shall be complete and show all details, lumber sizes, and type and grade of materials to be used.
- C. Shop drawings, samples of hardware and literature shall be submitted. Color samples and literature on laminated plastic shall be submitted for review and color selection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Softwoods: Softwoods shall be vertical grain Douglas fir or white pine, meeting AWI Premium Grade requirements.
- B. Hardwoods: Hardwood shall be ash or birch, with a transparent finish conforming to AWI Custom Grade. Hardwood species shall not be mixed within a project.
- C. Plywood: Softwood plywood shall conform to the requirements of the U.S. Product Standards PS-1, Grade A for pine plywood. Hardwood plywood shall conform to the requirements of HPVA HP-1, Grade AA. Plywood backboards and plywood wainscots shall be APA Grade trademarked A-C-INT -APA. Backing for countertops shall be 3/4-inch thick particle board or plywood in accordance with written recommendations of the laminated plastic manufacturer.

2.2 PLASTIC LAMINATES

- A. Laminated plastic shall be high-pressure-laminated plastic conforming to NEMA LD-3.
- B. Color and textures shall be selected by the Owner from the manufacturer's full product range.

2.3 PANEL PRODUCTS

- A. Core shall be medium density fiberboard with minimum weight of 37 pound per cubic foot. Optional material is plywood meeting APA standards for custom casework. Moisture content shall be same as specified for lumber.

- B. Edgings: To be bullnosed laminate finish. Shelving in casework shall have melamine facings and shall have PVC edging or "T" molding. Color to be selected by owner.
- C. Facings: Exposed faces of cabinets shall have plastic laminate finish.

2.4 CABINET AND CASEWORK

- A. Cabinet and casework shall conform to AWI Premium grade, with face frame and flush overlay type door and drawer construction. Cabinet WORK shall receive laminated plastic finish unless otherwise shown.
- B. Cabinet Component Thickness & Material: Use plastic laminate facing except, cabinet interiors and shelving faces behind cabinet doors.
 - 1. Ends, Divisions, Bottoms, Tops: Use 3/4-inch panel product with hardwood veneer on outside and melamine interior faces.
 - 2. Rails: Use 3/4-inch edge-banded panel product with melamine interior face.
 - 3. Shelves: Use edge-banded panel product with melamine faces, 3/4-inch thick for spans up to 36 inches and 1-inch thick for spans 36 to 48 inches. Provide Hafele or equal center supports for spans over 48 inches.
 - 4. Backs: Use 1/4-inch nominal panel product with melamine faces.
 - 5. Doors: Use 1/4-inch panel product with melamine interior face.
 - 6. Drawer Sides, Backs, & Subfronts: Use 1/2-inch panel product with melamine faces.
 - 7. Drawer Bottoms: Use 1/4-inch nominal panel product with melamine face.
 - 8. Drawer Front: Use 1/4-inch faced panel product with melamine face.
 - 9. Hardboard Shelves: Use 1/4-inch thick, smooth both sides. Color to match cabinet interior.
- C. All drawers shall have guides.
- D. Laminated plastic countertops, splashes, curbs, and shelves shall be of the same grade as cabinet and casework.

2.5 HARDWARE

- A. Cabinet & Drawer Pulls: Provide satin nickel flush Pulls as manufactured by Sugatesue America, Inc. or equal.
- B. Cabinet Hinges: Provide European style, self-closing as manufactured by Grass or equal.
- C. Guides: Provide full extension, steel ball bearings with 100-pound load rating for standard and pencil drawers and 150-pound load rating for lateral file. Guides shall be as manufactured by Accuride or equal.

- D. Hinges: Provide heavy duty hinges that have wrap-around 2-1/4-inch minimum width and butts of 0.083-inch thick steel. Provide off-set for overlay door installation with a minimum of 5 No.8 full thread screws to the jamb and 4 No.8 full thread screws to the door. Loose pin butts of 0.083-inch-thick steel shall be National 8-377 or equal.

2.6 ACCESSORIES

- A. Hardboard: Hardboard shall conform to AHA A 135.4, tempered type. Where hardboard is shown for tool boards it shall be 1/4-inch thick and shall be perforated on 1-inch centers to accept pegboard hooks.
- B. Nails for exterior millwork and siding shall be stainless steel where exposed to the elements and galvanized where concealed.
- C. Lag screws, wood screws, and other rough hardware shall be per AWI standards for grade(s) specified.
- D. Wood screws shall conform to FS FF-S-111D (1). Cadmium plated screws, bolts and washers shall be used on exposed interior work. Screws for exterior use shall be stainless steel.

PART 3 - EXECUTION

3.1 GENERAL

- A. Millwork, cabinets and casework shall be manufactured, fabricated and installed in accordance with the AWI Standards for Millwork.
- B. The Contractor shall verify drawing dimensions in the field and shall inspect related Work and adjacent surfaces. Any conditions, which will prevent proper execution of the Work, shall be reported to the Engineer.

3.2 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered in original, unbroken packages, containers, or wrappings, bearing the name of the manufacturer, along with identification markings. Materials shall be protected during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. All materials and products shall be carefully stored in conformance with referenced standards, in an area that is protected from the deleterious elements, and in a manner recommended by the material manufacturer.

3.3 INSTALLATION

- A. Casework shall not be installed until painting, wet Work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in the installation areas and the building is fully enclosed, with sufficient heat provided, dust generating activities have terminated, and overhead mechanical and electrical Work is completed, tested, and approved.

- B. All Work shall be true and straight, with edges clean cut, and assembled with members properly housed together and tightly jointed. Joints subject to strain shall be reinforced with screws or bolts to assure their tightness. The method of joining and reinforcing shall be as indicated on the shop drawings. Work shall be accurately positioned and installed plumb and level, with separate parts fitted and properly aligned. Single lengths of wood shall be used whenever practicable. Trim shall have plowed backs unless otherwise shown.
- C. Countertops, box curbs, splashes, and ends shall be installed true, level, straight and aligned. Sections shall be properly housed together, tightly jointed, and clamped. Shop drawings shall show the jointing pattern, method of jointing, and reinforcement. Countertops shall be installed in sections as large as possible with the fewest joints. They shall be accurately positioned and installed plumb and level with hairjoints and no rises or bumps at joints. Epoxy items shall be installed by experienced epoxy craftsmen or under the direct supervision of experienced craftsmen.
- D. Holes and cutouts shall be provided in casework as required for plumbing, conduits, and other penetrations, or inserts shall be provided as part of the Work.
- E. Provisions shall be made for access to plumbing valves and cleanouts, and connections of electrical Work.
- F. Casework shall be installed plumb, level, true and straight, with no distortions. Shimming shall be accomplished as required, using concealed shims. Where laboratory casework abuts other finished Work, scribe and apply filler strips for accurate fit with fasteners concealed where practicable.
- G. Base cabinets shall be set straight, plumb, and level. Sub-tops shall be adjusted within 1/16-inch of a single plane.
 - 1. Each individual base cabinet shall be fastened to the floor at the toe space, with fasteners spaced no more than 2 feet on center. Where individual cabinets do not adjoin other cabinets, they shall be secured with not less than two fasteners into the floor.
 - 2. Continuous cabinets shall be bolted together. Where required, units shall be assembled into one integral unit with joints flush, tight, and uniform. Similar adjoining doors and drawers shall be aligned to a tolerance of 1/16-inch.
- H. Wall cabinets shall be securely fastened to solid supporting material, not plaster, lath, or wallboard. Wall cabinets shall be anchored, adjusted, and aligned as indicated for base cabinets. Coordinate accurate location and sizing of reinforcement in substrate walls during their erection, as required to properly support wall-mounted cabinets.
- I. Casework and finish hardware shall be adjusted so that doors and drawers operate smoothly without warp or bind. Operating hardware shall be lubricated as recommended by the manufacturer.

3.4 TOP INSTALLATION

- A. Tops and splashes shall be provided in sections as large as possible, with the fewest possible joints. Where necessary, field jointing shall be accomplished in the same manner

as factory jointing, using dowels, splines, adhesives, and fasteners as recommended by the manufacturer. Field joints shall be located as shown on shop drawings and shall be factory prepared so there is no site processing of top and edge surfaces.

3.5 CLEANING AND PROTECTION

- A. At the completion of the installation, defective Work shall be repaired or removed and replaced as directed by the Engineer at no additional cost to the owner.
- B. Protection: Take all procedures and precautions necessary to properly protect the completed installation from damage and soiling by subsequent construction, until final acceptance.

END OF SECTION 06 40 00



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SECTION 06 70 00 – STRUCTURAL COMPOSITES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, materials and equipment as required to install glass fiber and resin fabrications, as shown on the Plans. Coordinate work with other contractors.

1.2 REFERENCE STANDARDS

- A. ASTM E84 Surface Burning Characteristics of Building Materials
- B. ASTM D256 Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
- C. ASTM D570 Water Absorption of Plastics
- D. ASTM D635 Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
- E. ASTM D638 Tensile Properties of Plastics
- F. ASTM D696 Coefficient of Linear Thermal Expansion of Plastics Between – 30 Degrees C and 30 Degrees C with a Vitreous Silica Dilatometer
- G. ASTM D790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- H. ASTM D2344 Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- I. ASTM D2583 Indentation Hardness of Rigid Plastics by means of a Barcol Impressor.
- J. ANSI/AWWA F102 Matched Die-Molded, Fiberglass-Reinforced Plastic Weir Plates, Scum Baffles, and Mounting Brackets

1.3 SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 – Submittal Procedures.
- B. Shop Drawings: Shop Drawings for every Fiberglass Resin Plate (FRP) item. Include plans, elevations, and profiles that clearly show material sizes, types, styles, parts or catalog numbers. Drawings shall include complete details for the fabrication and erection of components, including location, dimensions, lengths, joining method, type and size of fasteners, clip angles, member sizes, and connection details.
 - 1. Grating Drawings shall indicate the following:

- a. Show the direction of span, type and depth of grating;
 - b. Size and shape of grating panels;
 - c. Seat angle details, and details of grating hold down fasteners;
 - d. Flush mounted lifting handles where required;
 - e. Loading each panel is designed for;
- C. Product Literature: Manufacturer's published literature including structural design data, structural properties, and load and deflection tables for each style and depth of grating used, corrosion resistance tables, certificates of compliance, test reports (as applicable), and anchoring systems and allowable load tables and ICBO reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Experience: Items provided under this Section shall be furnished only by manufacturers having experience in the manufacture of similar products, with a record of 5 similar successful installations in the last 5 years.
- B. Quality: All fiberglass items shall be constructed of new, first-class, commercial-quality, fiberglass fabric-reinforced polyester or vinyl ester resin laminate material of the strength, thickness, and dimensions indicated herein. Weirs and baffles shall be manufactured using the matched die-molded method. All other structural fiberglass members, gratings, and structural shapes shall be manufactured by open mold or pultrusion methods.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. FRP items shall be composed of fiberglass reinforcement and resin in quantities, qualities, properties, arrangements, and dimensions as necessary to meet the design requirements and dimensions indicated.
- B. Fiberglass reinforcement shall be continuous roving, continuous strand mat, and surfacing veil or a combination thereof in sufficient quantities for the application and physical properties required.
- C. Unless indicated otherwise, resin shall be fire retardant isophthalic polyester or vinyl ester with chemical formulation as necessary to provide the corrosion resistance, strength, and other physical properties as required. FRP items used in chemical storage or containment areas shall be vinyl ester resin, with chemical formulations as necessary to provide the corrosion resistance, strength, and other physical properties required in those areas.
- D. Finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids, and without dry spots, cracks, or unreinforced areas. Glass fibers shall be well covered with resin to protect against exposure from wear or weathering.

- E. Resin for all FRP items shall include an UltraViolet (UV) inhibitor additive. FRP products located in exterior locations exposed to the weather or in UV facilities shall also have an additional 1 mil UV coating applied.
- F. FRP products shall have a tested flame spread rating of 25 or less per ASTM E84. Gratings and stair treads shall also meet the self-extinguishing requirements of ASTM D635.
- G. Supports and Fasteners: The Contractor shall provide all bolts, anchor bolts, nuts, washers, and supports as required for the WORK of this Section in accordance with the requirements of the manufacturers of the items. Bolts, anchor bolts, washers and supports shall be of Type 316 stainless steel. Concrete anchor systems shall be in accordance with Section 05 50 00 – Metal Fabrications.
- H. All cut or machined edges, holes, scratches, gouges, and abrasions shall be sealed with a resin compatible with the resin matrix used in the original item.
- I. Load/Deflection Requirements: Grating, Covers, and Treads shall be capable of spanning the distances indicated with a minimum safety factor of 3 for all stresses and without exceeding a deflection equal to the lesser of 1/4 inch or the span divided by 180. Unless noted otherwise on plans, the loading used for determining stresses and deflections shall be the uniform live load of the adjacent floor area or 100 pounds per square foot, whichever is greater, and an independent concentrated load of 1000 pounds at the center of the span, unless otherwise indicated.

2.2 FIBERGLASS PULTRUDED GRATING

- A. Pultruded FRP grating shall be fabricated from bearing bars and cross rods manufactured by the pultrusion process. The glass fiber reinforcement for the bearing bars shall have a core of continuous glass strand rovings wrapped with a continuous strand glass mat. The outermost layer covering shall be a surface veil to provide a resin-rich surface. Bearing bars shall be interlocked and chemically bonded into place to provide a panel that resists twist forces and prevents internal movement of the bearing bars.
- B. Seat Angles: Where grating is supported on concrete members, continuous embedded seat angles shall be provided on all sides. Grating seat angles shall be made of FRP and be as detailed on the Drawings; except that specially manufactured pultruded FRP seat angles intended to be cast in concrete may be submitted for acceptance by the Engineer.
- C. Raised Floor Grating: Wherever raised floor grating is indicated, provide a complete system of FRP grating. FRP support legs and seat angles, fastening devices, and other accessories necessary for a complete installation. Grating and supports shall be designed to fit together tightly with no movement when subjected to the design loading. The support legs and grating shall be produced by the same manufacturer and be intended to work together as a unit. The spacing of the legs shall be determined so as not to interfere with piping and equipment and to meet the requirements indicated herein.
- D. Color: The color of the grating and seat angles shall be determined by the Owner. The color selected shall result in no additional cost to the Owner.
- E. The top surface of all grating shall be provided with a non-slip surface by embedding or bonding grit to the FRP.

- F. Penetrations: Cutouts shall be provided where needed for penetrations through the grating. The grating shall be reinforced where necessary to meet the load/deflection requirements despite the cutouts.
- G. Dimensional Requirements: When grating is designed to span primarily in one direction, the grating shall be fabricated to span in the shorter span direction, unless indicated otherwise. Individual pieces of grating shall not exceed 110 pounds in weight, unless noted otherwise.
- H. All removable grating shall be provided with a recessed Type 316 SS lifting handle.
- I. Mechanical grating clips shall be manufactured of Type 316 stainless steel. Grating hold-down clips shall be provided, spaced at a maximum of 4 feet apart or as recommended by the manufacturer, whichever is less. A minimum of 4 clips per piece of grating is required.
- J. Pultruded FRP grating shall be Safe-T-Span by Fibergrate Composite Structures, Inc.; Corgrate by IKG Industries; Duradek by Strongwell; or equal

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY AND STORAGE

- A. Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins, catalysts, and hardeners shall be crated or boxed separately.
- B. All materials shall be carefully handled to protect them from abrasion, cracking, chipping, twisting, deformations, and other types of damage. Store items in an enclosed area and free from contact with soil and water. Store adhesives, resins, catalysts, and hardeners in dry indoor storage facilities between 70 and 85 degrees Fahrenheit. There shall be labels on the outside of the boxes indicating that the products shall be stored as described above.

3.2 GENERAL

- A. FRP products shall meet the dimensional requirements and tolerances indicated. The Contractor shall verify measurements and determine correct size and locations of required holes or cutouts from field dimensions before fabrication.
- B. FRP products shall be fabricated free from warps, twists, or other defects which affect appearance and serviceability.
- C. The Contractor shall give ample notice prior to the beginning of any fabrication work so that the Engineer can perform shop inspections.
- D. The Contractor shall install FRP structures in accordance with the manufacturer's assembly drawings. Field cut and drill FRP products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products.

- E. Bonding of FRP items shall be through the use of an epoxy adhesive recommended by the manufacturer of the particular item. The surfaces to be bonded shall be solvent cleaned and abraded sufficiently to remove the surface gloss and to remove any mold release agent or other contaminants which may interfere with proper bonding. The adhesive manufacturer's instructions and recommendations shall be followed. The items bonded shall not be stressed until at least 48 hours have passed.

3.3 GRATING

- A. Layout: Each grating section shall be readily removable, except where indicated. As much as possible, manufacturer shall provide openings and holes where indicated on the Contract Drawings. Grating openings which fit around protrusions (pipes, cables, machinery, etc.) shall be discontinuous at approximately the centerline of opening so each section of grating is readily removable. Gaps between the grating and adjacent walls or equipment shall not be greater than 2-inches.
- B. Install the grating with a minimum 1-1/2 inch bearing surface at the support ends.
- C. Tolerances between sections shall provide for not more than 1/4 inch clearance between adjacent sections or between grating and frames. Adjacent sections shall line up to form an uninterrupted straight line, where possible.
- D. The grating shall be as free, as commercially possible from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles, and pits. The surface shall have a smooth finish (except for non-slip surfaces).
- E. Seat angles shall be mitered and bonded at corners to produce smooth, even, level seating surface.
- F. Grating shall be installed so that the top surface is level and even with adjacent walking surfaces. There shall be no protrusions above the top surface.
- G. All grating shall be fastened to supports.

3.4 WEIR PLATES

- A. Weir plates shall be installed plumb and level, free of warp or twist, within plus or minus 1/8 inch over the length of the weir.

3.5 STRUCTURAL SHAPES

- A. Measurement: The Contractor shall verify all dimensions and shall make any field measurements necessary, and shall be fully responsible for accuracy and layout of Work. The Contractor shall review the Drawings, and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.
- B. Fabrication: Structural FRP shall be fabricated in accordance with the Drawings and as indicated on the Shop Drawings. Materials shall be properly marked and match-marked for field assembly. Where finishing is required, assembly shall be completed including bolting before starting of finishing operations.

- C. Connections: Shop and field connections shall be bonded and bolted as indicated. Unless indicated otherwise, connections shall develop full strength of members joined.
- D. Holes for other Work: Holes shall be provided as necessary or as indicated for securing other work to FRP framing, and for the passage of other Work through FRP members. Threaded nuts shall be epoxied to framing, and other specialty items as indicated to receive other Work. Field cuts and drilled edges shall be sealed with a resin compatible with the original resin and recommended by the manufacturer. The sealing of the edges shall prevent premature fraying at the field cut edges.
- E. Erection: Anchor bolts and other connectors required for securing structural FRP to in-place Work and templates and other devices for presetting bolts and other anchors to accurate locations shall be furnished by the Contractor. The Contractor shall be responsible for designing and installing any temporary bracing required for the safe erection of all structural FRP members.
- F. Setting bases and bearing plates: Prior to the placement of nonshrink grout beneath base and bearing plates, the bottom surface of the plates shall be cleaned of all bond-reducing materials. Concrete and masonry bearing surface shall also be cleaned of all bond-reducing materials and be roughened to improve bonding.
 - 1. Loose and attached base plates and bearing plates for structural members shall be set on wedges, leveling nuts, or other adjustable devices.
 - 2. Anchor bolts shall be tightened after the supported members have been positioned and plumbed and the nonshrink grout has attained its required strength.
 - 3. Base plates shall be grouted with nonshrink grout to assure full uniform bearing. Grouting shall be done prior to placing loads on the structure.
- G. Field Assembly: Structural frames shall be set accurately to the lines and elevations indicated. The various members shall be aligned and adjusted to form a part of a complete frame or structure before permanent fastening. Bearing surfaces and other surfaces that will be in permanent contact shall be cleaned before assembly. Necessary adjustments to compensate for discrepancies in elevations and alignments shall be performed. Individual members of the structure shall be leveled and plumbed within required tolerances. The Contractor shall provide and install all temporary bracing required until structure is complete.
- H. Misfits at Bolted Connections: Where misfits in bolting are encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misfit for review by the Engineer. The Engineer will determine whether the remedy is acceptable or if the member must be refabricated. Methods of remedy may include, but are not limited to the following:
 - 1. Reaming holes that must be enlarged to admit oversized bolts.
 - 2. Drilling additional holes in the connection, to conform to manufacturer's standards for bolt spacing, end, and edge distances, and adding additional bolts.

3. Rejecting the improperly fabricated member and fabricating a new member to ensure proper fit.
4. Mid-sized or misaligned holes in members shall not be enlarged by burning of by the use of drift pins.
5. The Contractor shall pay costs associated with the repair of misfits.

END OF SECTION 06 70 00



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SECTION 07 11 13 – BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and apply cold-applied asphalt emulsion damp-proofing at all below grade structures, including building foundations, precast structures used for wetwells, manholes and valve/meter vaults, as specified herein.

1.2 REFERENCE STANDARDS

- A. ASTM D449 Standard Specification for Asphalt Used in Dampproofing and Waterproofing
- B. ASTM D1187 Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
- C. ASTM D1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
- D. NRCA (WM) The NRCA Waterproofing Manual

1.3 SUBMITTALS

- A. Submit manufacturer's technical product data in accordance with Section 01 33 00 – Submittal Procedures. Shop drawing information shall include installation instructions, and recommendations for each damp-proofing material required. Provide properties of primer, bitumen, and mastics.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Applier shall be a firm which has specialized for no less than three years in installation of types of damp-proofing required for this project and which is acceptable to manufacturer of primary materials.
- B. Warranty: Furnish a written warranty for unconditional water-tightness for a period of two years from the date of substantial completion.

1.5 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees Fahrenheit for 24 hours before and during application until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
 - 1. Composition – Vertical Application: ASTM D1227 Type III or ASTM D1187 Type I
 - 2. VOC Content: Not more than permitted by Local, State and Federal Regulations
 - 3. Applied Thickness: 1/16-inch, minimum, wet film.
- B. Dampproofing Protection Course: multi-ply, semi-rigid core manufactured in accordance with ASTM D6506.
 - 1. Thickness: 0.220-inch minimum.
 - 2. Puncture Strength: 82 pound minimum.
 - 3. Bituminous dampproofing and protection course to be by same manufacturer or dampproofing manufacturer's recommendations.

2.2 MANUFACTURER

- A. The approved manufacturer shall be subject to compliance with specified requirements:
 - 1. Celotex Corporation
 - 2. Manville Building Products Corp.
 - 3. Tamko Asphalt Products, Inc.
 - 4. Tremco Company
 - 5. W.R. Meadows, Inc.
 - 6. Or equal

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proceed with damp-proofing work only when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer's recommendations.
- B. Provide adequate ventilation to prevent accumulation of hazardous fumes during application of solvent-based components in enclosed spaces and maintain ventilation until coatings have thoroughly cured.

- C. Clean substrate of projections and substances detrimental to work; comply with recommendations of prime materials manufacturer. Fill voids, seal joints, and apply bond breakers (if any) as recommended by prime materials manufacturer, with particular attention at construction joints.

3.2 APPLICATION

- A. Comply with manufacturer's instructions as to application rates and application methods.
- B. Apply damp-proofing to all exterior below grade surfaces of exterior underground walls of building structures, tanks, and precast structures in contact with earthwork or other backfill, in any situation where space of any kind is enclosed on opposite side. Extend over top of footing and turn down minimum of 6 inches over outside face of footing
- C. Extend vertical damp-proofing down walls from finished grade line to top of footing. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces which will be exposed to view when project is completed.
- D. Install protection course as indicated by manufacturer's recommendations over completed and cured damp-proofing to protect the damp-proofing from damage during backfilling. Comply with damp-proofing materials manufacturer's instructions for support or attachment of protection materials. Protection course is not required on precast manholes and vaults.

END OF SECTION 07 11 13



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SECTION 07 21 00 – THERMAL PROTECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install building insulation as shown on the drawings and as specified herein. Applications of insulation specified in this section include the following
 - 1. Board insulation at perimeter foundation wall (polystyrene) (supporting backfill).
 - 2. Foam in place insulation .
 - 3. Cavity wall insulation
 - 4. Batt Insulation at roof.

1.2 REFERENCE STANDARDS

- A. HH-I-1972/1 Insulation Board, Thermal, Polyurethane or Polyisocyanurate, Faced With Aluminum Foil on Both Sides of the Foam
- B. L-P-375C(3) Plastic Film, Flexible, Vinyl Chloride
- C. TT -5-001657 Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type (For Buildings and Other Types of Construction)
- D. ASTM C578 – Specification for Rigid, Cellular Polystyrene Thermal Insulation
- E. ASTM C665 – Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- F. ASTM C1136 – Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
- G. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Material
- H. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
- I. ASTM D2626 Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing
- J. ANSI/ASTM A653 – General Requirements for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- K. ANSI/ASTM D41 – Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirement of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, product limitations, and formaldehyde content.
 - 1. Provide documentation indicating levels of formaldehyde content and Greenguard certification. Provide independent third-party verification.
- C. Manufacturer's Information: Manufacturer's literature, specifications, installation instructions, technical data, and general recommendations for the vapor retarder materials shall be submitted.
- D. Manufacturer's Certification: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by R-values, they represent the rate of heat flow through a homogenous material exactly 1-inch thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees Fahrenheit between the two exposed faces required to cause one BTU to flow through on square foot per hour at mean temperatures indicated.
- B. Fire Performance Characteristic: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface Burning Characteristics: ASTM E84.
 - 2. Fire Resistance Ratings: ASTM E119.
 - 3. Combustion Characteristics: ASTM E136.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The materials and application of building insulation shall conform to the applicable requirement of the Underwriters Laboratories, Fire Resistance Index, Factory Mutual requirements, manufacturer's printed recommendations and specifications, and Federal specifications.
- B. Thermal and acoustical insulation shall have a flame-spread rating of 25 or less and a smoke density not exceeding 450 when tested in accordance with ASTM E84.

- C. Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.
- D. Sizes to fit applications indicated, selected from manufacturer's standard thickness, widths and lengths.

2.2 MATERIALS

- A. Batt Insulation: Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used at Contractor's option.
 - 1. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit
 - a. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any
 - b. Formaldehyde Content: Zero
 - c. Thermal Resistance: R-value of 49, minimum
 - d. Facing: Aluminum foil, flame spread 25 rated; one side
 - 2. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 when tested in accordance with ASTM E84
 - a. Smoke Developed Index: 0, when tested in accordance with ASTM E84
 - b. Thermal Resistance: R-value of 49, minimum
- B. Thermal Wall Insulation: Where indicated on Drawings, thermal wall insulation at exterior masonry or concrete walls shall be reflective membrane face fiber glass batts with a minimum "R" value of 21 and conforming to ASTM C665.
- C. Sound Insulation: Where indicated on Drawings, sound insulation shall be not less than 3-1/2-inch thick Kraft paper-faced mineral fiber batts, confirming to ASTM C665 Type II, Class B.
- D. Below-grade Insulation: Below-grade insulation at footings and foundation walls shall be 2-inch thick rigid expanded or extruded polystyrene "Styrofoam"- thermal insulation conforming to ASTM C 578, Type IV. Insulation shall have a minimum compressive strength of 25 psi, maximum water vapor transmission rate of 1.5 perm-in, density of 1.5 pounds per cubic foot and an -R- value of 5 per inch of thickness. Acceptable manufacturers include Amoco Foam Products Co., Dow Chemical U.S.A., Minnesota Diversified Products, Inc., UC Industries, or approved equal
- E. Foam in Place Insulation: Foam in place insulation shall be a tripolymer product using a phenol based synthetic polymer. The system shall consist of two components: an aqueous resin solution and a foaming catalyst. The two components shall be mixed with compressed

air to produce a foam in place operation. Provide foam-in-place insulation as manufactured by C.P. Chemical Co., Inc. or Equal

- F. Thermal Spacer Blocks: Fabricated from extruded polystyrene, 1-inch

2.3 ACCESSORIES

- A. Fasteners: Fasteners shall be per written recommendations of the manufacturer of the insulating materials.
- B. Aluminum Foil Tape: Aluminum foil tape shall be 2 inches wide "Aluma-Grip No. AF7-701" manufactured by Hardcast, Inc. (800-527-7092), or equal.
- C. Concrete Primer: Concrete primer shall conform to ANSI ASTM D41.
- D. Vapor Retarder Membrane System for Walls and Ceilings: See Section 07 25 00 – Weather Barriers for membrane requirements.
- E. Foam Sealant: Provide one of the following at perimeter window and door shim spaces and crevices in exterior wall and roof:
1. One-component, minimally expanding, low pressure-build, polyurethane foam sealant.
 2. Closed cell, medium density spray applied polyurethane foam insulation and air barrier.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with manufacturer's instruction for particular conditions of installation in each case. If printed instructions are not available or do not apply to protect conditions, consult manufacturer's technical representative for specific recommendations before proceeding with Work.
- B. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- C. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.
- D. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.
- E. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

3.2 DELIVERY AND STORAGE

- A. Protection insulation (minimum level B or better) during delivery and store against moisture absorption or other damage. Reject material with broken wrappers or cartons.

3.3 INSTALLATION AND PREPARATION

- A. Insulation shall be installed in accordance with the manufacturer's printed installation instructions.
- B. Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified. Obtain Installer's written report listing conditions detrimental to performance of Work in this Section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.
- C. Clean substrates of substances harmful to insulation or vapor retarders, including removal of projections which might puncture vapor retarders.
- D. Blocking for wall-mounted items and items installed within furring and walls shall be securely installed prior to installation of insulation.
- E. Extruded polystyrene foam board insulation shall be secured by construction adhesive.
- F. Below-grade insulation shall have insulation protective board installed between below-grade insulation and backfill.
- G. Insulation shall be installed to provide maximum sound and thermal benefits for material specified. The insulation shall be installed to completely fill or cover voids between furring studs, providing a continuous blanket of insulation. Insulation shall be cut neatly to snugly fit angles, corners and irregular areas and carefully wrapped around pipes, conduits, outlets, switches, beams, etc., to maintain continuity of insulation. Gaps or bridges shall be avoided. Insulation shall be tight fitting batts and shall be secured as recommended by the Code and the material manufacturers for job conditions.
- H. Vapor retarder shall be installed continuously on the warm side of insulation.

3.4 INSTALLATION OF FOAM IN PLACE INSULATION

- A. Foam in place insulation shall be installed by an applicator certified by the product manufacturer using special equipment for installation of the foam product.

3.5 INSTALLATION OF NAILBOARD

- A. Installation shall be in strict accordance with manufacturer's published instructions, details and drawings that are part of the contract documents for the project. Panel shall be installed over structurally sound substrate. Install vapor retarder to the existing substrate prior to the installation of the panels.

- B. Panels shall be mechanically fastened with screws long enough to penetrate decking and/or structural members a minimum of 1-inch and provide adequate hold. Fastener spacing shall be designed by the panel supplier.
- C. Approximately 1/8-inch spacing between panels shall be provided to allow for expansion. Wood blocking shall be provided at all perimeters and openings. Connection splines shall be provided.
- D. Roofing materials shall be installed per manufacturer's specifications and recommendations.

END OF SECTION 07 21 00

SECTION 07 21 12 – THERMAL PROTECTION FOR METAL BUILDINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install building insulation as shown on the drawings and as specified herein. Applications of insulation specified in this Section include the following

1. Batt Insulation at walls.
2. Blanket Insulation at walls and roof.

1.2 REFERENCE STANDARDS

- A. Federal Specifications:

1. L-P-375C(3) Plastic Film, Flexible, Vinyl Chloride
2. TT -5-001657 Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type (For Buildings and Other Types of Construction)

- B. Commercial Standards:

1. ASTM C665 Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
2. ASTM D2626 Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing
3. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials
4. ANSI/ASTM A653 General Requirements for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
5. ANSI/ASTM D41 Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

1.3 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

- B. Manufacturer's Information: Manufacturer's literature, specifications, installation instructions, technical data, and general recommendations for the vapor retarder materials shall be submitted.
- C. Manufacturer's certification or other data substantiating that the proposed materials comply with the Specification shall be submitted.

1.4 QUALITY ASSURANCE

- A. Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by R-values they represent the rate of heat flow through a homogenous material exactly 1-inch thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees Fahrenheit between the two exposed faces required to cause one BTU to flow through on square foot per hour at mean temperatures indicated.
- B. Fire Performance Characteristic: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by Underwriters Laboratories or other testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface Burning Characteristics: ASTM E84.
 - 2. Fire Resistance Ratings: ASTM E119.
 - 3. Combustion Characteristics: ASTM E136.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The materials and application of building insulation shall conform to the applicable requirement of the Underwriters Laboratories, Fire Resistance Index, Factory Mutual requirements, manufacturer's printed recommendations and specifications, and Federal specifications.
- B. Thermal and acoustical insulation shall have a flame-spread rating of 25 or less and a smoke density not exceeding 450 when tested in accordance with ASTM E84.
- C. Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.
- D. Sizes to fit applications indicated, selected from manufacturer's standard thickness, widths and lengths.

2.2 MATERIALS

- A. Batt Insulation: Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used at Contractor's option. R-Values must comply with the minimum values shown in the ComCheck report provided on A-602.
 - 1. Glass Fiber Batt Insulation: Flexible preformed batt, complying with ASTM C665; friction fit
 - a. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any
 - b. Formaldehyde Content: Zero
 - c. Thermal Resistance: Refer to ComCheck
 - d. Facing: Aluminum foil, flame spread 25 rated; one side
 - 2. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 when tested in accordance with ASTM E84
 - a. Smoke Developed Index: 0, when tested in accordance with ASTM E84
 - b. Thermal Resistance: Refer to ComCheck
- B. Blanket Insulation: Where blanket insulation is indicated provide a glass fiber blanket insulation.
 - 1. Glass Fiber Blanket Insulation: Provide flexible resin bonded glass fiber blanket insulation conforming to ASTM C 665, Type II (non-reflective facing), Class A as shown on drawings.
 - 2. Where facings are not in direct contact with code approved building materials such as drywall, plywood, acoustic ceiling tile, or similar material, or where required by authority having jurisdiction, provide a product with facing having a flame spread index of 25 or less (Class A) and smoke development index of not more than 450.
 - 3. R-value: Refer to ComCheck
 - 4. Vapor-resistant membrane coverings shall have a vapor permeance of no more than 1 perm.
- C.
- D. Thermal Spacer Blocks: Fabricated from extruded polystyrene, 1-inch

2.3 ACCESSORIES

- A. Fasteners: Fasteners shall be per written recommendations of the manufacturer of the insulating materials.

- B. Aluminum Foil Tape: Aluminum foil tape shall be 2 inches wide "Aluma-Grip No. AF7-701" manufactured by Hardcast, Inc. (800-527-7092), or equal.
- C. Concrete Primer: Concrete primer shall conform to ANSI ASTM D41.
- D. Vapor Retarder Membrane System for Walls and Ceilings: See Section 07 25 00 – Weather Barriers for membrane requirements.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with manufacturer's instruction for particular conditions of installation in each case. If printed instructions are not available or do not apply to protect conditions, consult manufacturer's technical representative for specific recommendations before proceeding with Work.
- B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.
- C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

3.2 DELIVERY AND STORAGE

- A. Protection insulation (minimum level B or better) during delivery and store against moisture absorption or other damage. Reject material with broken wrappers or cartons.

3.3 INSTALLATION AND PREPARATION

- A. Insulation shall be installed in accordance with the manufacturer's printed installation instructions.
- B. Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified. Obtain Installer's written report listing conditions detrimental to performance of Work in this Section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.
- C. Clean substrates of substances harmful to insulation or vapor retarders, including removal of projections which might puncture vapor retarders.
- D. Blocking for wall-mounted items and items installed within furring and walls shall be securely installed prior to installation of insulation.
- E. Extruded polystyrene foam board insulation shall be secured by construction adhesive.
- F. Below-grade insulation shall have insulation protective board installed between below-grade insulation and backfill.

- G. Insulation shall be installed to provide maximum sound and thermal benefits for material specified. The insulation shall be installed to completely fill or cover voids between furring studs, providing a continuous blanket of insulation. Insulation shall be cut neatly to snugly fit angles, corners and irregular areas and carefully wrapped around pipes, conduits, outlets, switches, beams, etc., to maintain continuity of insulation. Gaps or bridges shall be avoided. Insulation shall be tight fitting batts and shall be secured as recommended by the Code and the material manufacturers for job conditions.
- H. Vapor retarder shall be installed continuously on the warm side of insulation.

3.4 INSTALLATION OF FOAM IN PLACE INSULATION

- A. Foam in place insulation shall be installed by an applicator certified by the product manufacturer using special equipment for installation of the foam product.

3.5 INSTALLATION OF RIGID INSULATION

- A. Installation shall be in strict accordance with manufacturer's published instructions, details and drawings that are part of the contract documents for the project. Panel shall be installed over structurally sound substrate. Install vapor retarder to the existing substrate prior to the installation of the panels.
- B. Panels shall be mechanically fastened with screws long enough to penetrate decking and/or structural members a minimum of 1-inch and provide adequate hold. Fastener spacing shall be designed by the panel supplier.
- C. Approximately 1/8-inch spacing between panels shall be provided to allow for expansion. Wood blocking shall be provided at all perimeters and openings. Connection splines shall be provided.
- D. Roofing materials shall be installed per manufacturer's specifications and recommendations.

END OF SECTION 07 21 12



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SECTION 07 25 00 – WEATHER BARRIERS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install water-resistive air barrier: Under exterior wall cladding, over sheathing and other substrate, not airtight or vapor retardant.
- B. Furnish and install Vapor Retarders: Materials to make exterior walls, joints, between exterior walls and roof, and joints around frames of openings in exterior walls water vapor resistant and airtight.
 - 1. Installed on interior of wall, under interior gyp board or interior sheathing.

1.2 REFERENCE STANDARDS

- A. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2018.
- B. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2016.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2021.
- F. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; 2021.

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirement of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Provide data on material characteristics.

PART 2 - PRODUCTS

2.1 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air Barrier Sheet, Mechanically Fastened:
 - 1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.

2. Water Vapor Permeance: 50 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (Desiccant Method) at 73.4 degrees F.
3. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for minimum of 5 hours, when tested in accordance with AATCC Test Method 127.
4. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 180 days of weather exposure.
5. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
6. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2 inches wide, compatible with sheet material, unless otherwise specified.
7. Manufacturers:
 - a. DuPont de Nemours, Inc; Tyvek Commercial Wrap with accessories
 - b. Fiberweb, Inc; Typar MetroWrap
 - c. Fortifiber Building Systems Group; WeatherSmart
 - d. Kingspan Insulation LLC; GreenGuard RainDrop Building Wrap
 - e. VaproShield, LLC; WrapShield IT - Integrated Tape

2.2 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

- A. Vapor Retarder Sheet: ASTM D4397 polyethylene film reinforced with glass fiber square mesh, clear.
 1. Thickness: 10 mil, 0.010 inch.
 2. Water Vapor Permeance: 0.076 perms, as required by referenced standard for thickness specified.
 3. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2 inches wide, compatible with sheet material.

2.3 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Flexible Flashing: Sheathing fabric saturated with air barrier coating and complying with the applicable requirements of ICC-ES AC148.
- C. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.

1. Width: 3-1/2 inches.
 2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.
- D. Vapor Retarder Tape: Coated polyester film with acrylic adhesive backing; pressure sensitive.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.2 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.3 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Vapor Retarders: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- D. Mechanically Fastened Sheets - On Exterior:
1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
 2. Overlap seams as recommended by manufacturer but at least 6 inches.
 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
 4. For applications specified to be airtight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
 5. Install the air barrier and vapor retarder underneath the jamb flashings.
 6. Install head flashings under the weather barrier.
 7. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- E. Mechanically Fastened Sheets - Vapor Retarder on Interior:

1. When insulation is to be installed in assembly, install vapor retarder over insulation.
2. Seal seams, laps, perimeter edges, penetrations, tears, and cuts with self-adhesive tape, making airtight seal.
3. Locate laps at a framing member; at laps fasten one sheet to framing member then tape overlapping sheet to first sheet.
4. Seal the entire perimeter to structure, window and door frames, and other penetrations.
5. Where conduit, pipes, wires, ducts, outlet boxes, and other items are installed in insulation cavity, pass vapor retarder sheet behind item but over insulation and maintain air tight seal.

F. Openings and Penetrations in Exterior Weather Barriers:

1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At the head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.4 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by Manufacturer.

END OF SECTION 07 25 00

SECTION 07 30 10 - ROOFING UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies underlayment for sloped roofs.
 - 1. Self-adhering sheet membrane
 - 2. Asphalt saturated felt membrane (Siding)
- B. Related Sections: Refer to the following specification sections for coordination:
 - 1. Section 06 10 00 - Rough Carpentry
 - 2. Section 07 40 00 – Roofing and Siding Panels
- C. Referenced Standards: Comply with the requirements of the following standards published by ASTM International to the extent referenced in this section.
 - 1. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
 - 2. ASTM D461 - Standard Test Methods for Felt.
 - 3. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - 4. ASTM D1970 - Standard Specification for Self - Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 5. ASTM D3767 - Standard Practice for Rubber — Measurement of Dimensions.
 - 6. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - 7. ASTM G90 – EMMAqua test.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements of authorities having jurisdiction and applicable codes at the location of the project.
- B. Manufacturer: Minimum 10 years experience producing roofing underlayment.

- C. Installer: Minimum 2 years experience with installation of similar underlayment.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened factory labeled packages. Protect from damage.
- B. Cover materials and store in dry condition between temperatures of 40 and 90 degrees F (5 and 32 degrees C). Use within one year of date of manufacture. Do not store at elevated temperatures as that will reduce the shelf life of the product.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Self - Adhering Sheet Membrane Roof Underlayment: Provide HT Ice and Water Shield with the following characteristics:
 - 1. Material: Cold applied, self adhering membrane composed of a high strength polyethylene film coated on one side with a layer of rubberized asphalt adhesive and interwound with a disposable release sheet. An embossed, slip resistant surface is provided on the polyethylene.
 - 2. Membrane Thickness: 40 mil (1.02 mm) ASTM D3767 procedure A (Section 9.1).
 - 3. Tensile Strength, Membrane: 250 psi (1720 kN/m²) ASTM D412 (Die C modified).
 - 4. Elongation, Membrane: 250% ASTM D412 (Die C modified).
 - 5. Low Temperature Flexibility: Unaffected @ - 20°F (-29°C) ASTM D1970.
 - 6. Adhesion to Plywood: 3.0 lbs/in. width (525 N/m) ASTM D903.
 - 7. Permeance (Max): 0.05 perms (2.9 ng/m²s Pa) ASTM E96.
 - 8. Material Weight Installed (Max): 0.3 lb/ft² (1.3 kg/m²) ASTM D461.
 - 9. Service Temperature: 180 degrees F (82.2 degrees C) minimum per ASTM D1204
 - 10. Code and Standards Compliance: HT Ice and Water Shield meets the following:
 - a. Underwriters Laboratories Inc. Class A fire classification under fiber - glass shingles and Class C under organic felt shingles (per ASTM E108/UL 790).
 - b. International Conference of Building Officials (ICBO-ES) Report No. 3997.
- B. Asphalt Saturated Felt Membrane

1. Material: Asphalt saturated felt underlayment
2. Thickness: 30# felt membrane, 0.03" thick
3. Adhesion: Mechanically attached per manufacturer's recommendations
4. Standards Compliance:
 - a. ASTM D-4869 Type II

PART 3 - EXECUTION

3.1 EXAMINATION

- A. A. Prior to start of installation, inspect existing conditions to ensure surfaces are suitable for
- B. installation of roofing underlayment. Verify flashing has been installed. Starting work indicates installers acceptance of existing conditions.

3.2 INSTALLATION

- A. A. Installation:
 1. Install roofing underlayment on sloped surfaces at locations indicated on the
 2. Drawings:
 - a. Install asphalt saturated felt underlayment as shown on the Drawings.
 - b. Install self-adhered underlayment membrane as shown, but not at less than at hips, ridges, eaves, valleys, sidewalls and chimneys, and surfaces over interior space within 36 inches (914 mm) from the inside face of the exterior wall. Strictly comply with manufacturer's installation instructions including but not limited to the following:
 - 1) Schedule installation such that underlayment is covered by roofing within the published exposure limit of the underlayment.
 - 2) Do not install underlayment on wet or frozen substrates.
 - 3) Install when surface temperature of substrate is a minimum of 40 degrees F (5 degrees C) and rising.
 - 4) Remove dust, dirt, loose materials and protrusions from deck surface.
 - 5) Install membrane on clean, dry, continuous structural deck. Fill voids and damaged or unsupported areas prior to installation.

- 6) Install membrane such that all laps shed water. Work from the low point to the high point of the roof at all times. Apply the membrane in valleys before the membrane is applied to the eaves. Following placement along the eaves, continue application of the membrane up the roof. Membrane may be installed either vertically or horizontally after the first horizontal course.
- 7) Side laps minimum 3-1/2 inches (89 mm) and end laps minimum 6 inches (152mm) following lap lines marked on underlayment.
- 8) Patch penetrations and damage using manufacturer's recommended methods.

3.3 CLEANING AND PROTECTION

- A. Protection: Protect from damage during construction operations and installation of roofing materials. Promptly repair any damaged or deteriorated surfaces.
- B. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired in the opinion of the Engineer.
- C. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protective film and reclean as necessary immediately before final acceptance.

END OF SECTION 07 30 10

SECTION 07 40 00 – ROOFING PANELS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install architectural roof and soffit preformed steel panels as shown on the drawings and as specified herein. All metal panel products shall be provided by a single manufacturer.

1.2 REFERENCE STANDARDS

- A. The Design shall comply with the current version of the Oregon Structural Specialty Code (OSSC).
- B. AISI S100 – Specification for the Design of Cold-Formed Steel Structural Members
- C. AISC Steel Construction Manual
- D. ASTM A653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- E. ASTM A924 – Specification for General Requirement for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- F. ASTM D1790 – Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
- G. ASTM E283 – Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen”
- H. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference
- I. NRCA MS104 – The NRCA Roofing Manual: Steep-slope Roof Systems
- J. SMACNA (ASMM) – Architectural Sheet Metal Manual
- K. UL 263 – Standard for Fire Tests of Building Construction and Materials
- L. Coating Performance Reference Standards
- M. Manufacturer’s Standards: In addition to the standards listed above, all roof, wall, soffit panels, and their related accessories shall be in accordance with the manufacturer’s published recommendations and specifications.

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Summary of test results, indicating compliance with specified requirements.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty
- C. Shop Drawings: Include layouts of roof and/or soffit panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
 - 2. Indicate erection procedures and accessories required.
- D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of colors and patterns.
- E. Verification Samples: For each panel system specified, submit samples of minimum size 12-inches square, representing actual metal thickness, profile, color, and texture.
 - 1. Include typical panel joint in sample.
- F. Maintenance Data: For metal panels to include in maintenance manuals.
- G. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 10 years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least 10 years of documented experience.
 - 1. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least 5 years successful experience installing metal panel roofing systems similar to the specified system and having installed at least four roofing application of similar systems of equal or greater size within the last 12 months.
 - 2. Crew Experience and Supervision: Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and experienced foreman/superintendent on the job at all times roofing work is in progress.

- C. Perform Work in accordance with NRCA MS104 – NRCA Roofing Manual and manufacturer’s instructions.

1.5 WARRANTY

- A. Finish Warranty: Provide manufacturer’s special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 20 years from Date of Substantial Completion.
- B. Warrant steel panel core substrate against rupture, structural failure, or perforation due to exposure to normal atmospheric corrosion within a 25 year period after Substantial Completion.
- C. Waterproofing Warranty: Provide manufacturer’s warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of 20 years from Date of Substantial Completion.
 - 1. The warranty shall have a maximum 2 year installer’s obligation for weathertightness from Substantial Completion and shall not be tied to or reset by the occurrence of leaks within that or any other period.
 - 2. Pro-rated Systems Warranties are not acceptable.
 - 3. The warranty shall be from the manufacturer of the metal panel, not a marketer. No rebranded products shall be accepted.
 - 4. The warranty shall include the full assembly, including, but not limited to: metal panels, associated flashings, insulation, SAHTS, vapor barrier, fasteners, clips, etc.
 - 5. The warranty shall contain no exclusion or limitation for improper installation.
 - 6. Warranty coverage shall not be excluded for roof slopes down to and including 1:12.
 - 7. Manufacturer shall ultimately provide warranty responses in the event installer/contractor fails to.

PART 2 - PRODUCTS

2.1 PANELS

- A. Soffit Panels:
 - 1. Soffit panels shall be coated metal panels consisting of a concealed fastener soffit system for long overhang soffits. Installation shall be with framing system, girts or a solid substructure. No fasteners shall be visible after installation. The special locks shall prevent slipping of the panel. Provide smooth solid panels and lanced panels for ventilation where soffit vents are shown on the drawings. Install the strip first, followed by the J channel and soffit panel.

2. Soffit panels shall be fabricated with a concealed fastening system. Panel width shall be 12 inches. Panel lengths shall be cut to proper length to fit the installation requirements. The soffit panels shall be rollformed from minimum 24-gauge steel. Panel depth shall be a minimum of 7/16-inches.
- B. Roof Panels: Factory-formed panels with factory applied finish.
1. Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
 2. Profile Configuration: Standing Seam Metal Roof: Vertical 1-1/2-inch-high seams minimum with 12-inch panel. Minimum 24-gauge panels with striations.
 3. Length: Provide panels in the maximum length recommended by the manufacturer to minimize end laps.
 4. Panel: The panel shall be a standing seam metal roofing panel.
- C. Profile Composition:
1. Base Metal:
 - a. Material: Steel conforming to ASTM A792 Grade 50 (D) with a minimum yield strength of 50,000 psi. and thickness not less than 24-gauge.
 - b. Protective Coating: Galvanized G-90 coating in accordance with ASTM A653 and coated with a paint system specified below.
 2. Coating:
 - a. Paint system: Signature 300™ 0.8 mil 70% resin finish coat applied over a 0.2 mil baked-on base primer to a total film thickness of 1.0 mil.
 - b. Color selected by Owner from manufacturer's standard or premium color chips.
- D. Concealed-Clips:
1. Material: 20-gauge galvanized steel.

Configuration: Clips shall be designed as to fix by concealed fasteners, and fully engage the rib of every panel.
- E. Fasteners:
1. Clip Fasteners: Follow manufacturer's recommendations for clip attachment to the substrate shown on the drawings.
 2. Other Fasteners: Self-drilling or self-tapping screws or stainless steel pop rivets painted to match the panels where visible, per the panel manufacturer's recommendations.
- F. Flashing and Trim:

1. Flashing and/or trim shall be supplied at rakes, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and/or a finished appearance.
 2. Standard trim configurations and/or finishes for given conditions shall be determined by the specific roof and wall panel system and finish combinations.
 3. Trim finish shall be paint system Signature 300™ 0.8 mil 70% resin finish coat applied over a 0.2 mil baked-on base primer to a total film thickness of 1.0 mil. Color of the exterior finish shall be selected by the Owner/Engineer from the manufacturer's standard or premium colors.
- G. Mastics and Sealants:
1. Pre-formed tape mastics, and/or non-skinning tube sealants shall be used for the sidelaps and endlaps of all roof coverings.
 2. Tape Mastic shall be pre-formed butyl rubber-based compound conforming to TT-C-1796-A or approved equivalent. The compound shall be non-hardening, non-corrosive to metal and have excellent adhesion properties. Tape mastic shall be white or light gray in color. Tube Sealant shall be a synthetic elastomer-based material in gray or bronze.
 3. Gunnable Sealant: Use sealant to meet TT-S-00230C or approved equivalent.
- H. Preformed End Closures:
1. Closures, formed to match roof panel profiles shall be used to provide weather tightness. Closures shall be of a closed cell, non-absorbent, laminated, semi-rigid material, EPDM (Ethylene-Propylene-Duene-Monomer) foam in a gray or neutral color shaped to tightly fit the panel configuration.
- I. Finish:
1. FLUOROFINISH® (Polyvinylidene Fluoride) consisting of 0.25 +/- 0.05 mil primer on both sides with 0.75 +/- 0.1 mil 70 percent Signature 300 or Kynar 500 top coat.
 2. The exterior color shall be selected by Owner from manufacturer's standard or premium colors.
- J. Trim and Flashing Material:
1. Shall be of the same material, gauge, finish and color as the panels, unless otherwise indicated.
- K. Accessories:
1. Fasteners:
 - a. Type 304 Stainless Steel with 5/8-inch diameter combination neoprene bonded metal washers, shall be #14 Type A for sheet to sheet and Type B for sheet to structural steel support.

- b. Exposed fasteners color coated to match panels.
- 2. Closures:
 - a. Provide where called for on the drawings pre-molded flexible, cross-linked, closed-cell gray polyethylene foam to fit the contour of the panel specified.
 - b. Metal closures shall be manufactured from material that is the same finish and color of the adjacent metal panels and furnished where shown on drawings.
- 3. Tape Sealant shall be installed in all side and end laps of all metal panels and for all flashings, to assure weather tightness.
- L. Approved Manufacturers
 - 1. MBCI Metal Roof and Wall Systems
 - 2. Atas International Inc.
 - 3. Metal Sales Manufacturing Corporation
 - 4. Taylor Metal Products

2.2 FABRICATION

- A. Must be in compliance with dimensions, profile limitations, gauges and fabrication details of Manufacturer.
- B. Components shall be fabricated to the greatest extent possible in the factory ready for field assembly.

PART 3 - EXECUTION

3.1 DELIVERY AND STORAGE

- A. Materials shall be delivered to the site in a dry and undamaged condition and unloaded per the manufacturer's instructions. The installer shall inspect materials for damage and stains upon arrival to the site. Materials shall be stored out of contact with the ground in weathertight coverings to keep them dry per the manufacturer's recommendations. Storage accommodations shall provide good air circulation and protection from surface staining.

3.2 INSPECTION

- A. The installer shall examine substrates, areas, and conditions for compliance with requirements for installation tolerances, panel supports, and other conditions affecting performance of the Work.
- B. Field-check dimensions and check support alignment with a taut string or wire; support misalignment will cause panel "oil-canning."

- C. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- D. Should any condition be found which, in the opinion of the installer, will prevent proper execution of their work, the installer shall report such condition.
- E. Do not proceed until unsatisfactory conditions are corrected.

3.3 INSTALLATION

- A. Protect installed panels from abuse by other trades. The Contractor shall be responsible for protecting the panels from wet cement, plaster, painting operations, etc. The installer shall provide walk boards in heavy roofing traffic areas to prevent damage to panels. The metal roof panels shall be mechanically seamed with appropriate equipment as recommended by the manufacture.
- B. Install panels in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
- C. Accessories: Install all components required for a complete assembly, including flashings, trim, closure strips, and similar accessory items.
- D. Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by panel manufacturer.
- E. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA (ASMM).

3.4 DAMAGED MATERIAL AND CLEANING

- A. Replace damaged panels and other components of Work which cannot be repaired by finish touch-up or similar minor repair prior to Date of Substantial Completion.
- B. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.
- C. To prevent rust staining, remove immediately from finished surfaces any filings caused by drilling or cutting.

END OF SECTION 07 40 00



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SECTION 07 46 46 – FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install fiber-cement siding as shown on the Drawings and as specified herein.

1.2 RELATED REQUIREMENTS

- A. Section 07 25 00 – Weather Barriers: Weather barrier under siding.

1.3 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- C. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets; 2008 (Reapproved 2016).

1.4 SUBMITTALS

- A. A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods, including nail patterns.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products under waterproof cover and elevated above grade, on a flat surface.

1.6 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
 - 1. Style: Standard lap style.
 - 2. Texture: Simulated cedar grain.
 - 3. Length: 12 ft, nominal.
 - 4. Width (Height): 5-1/4 inches.
 - 5. Thickness: 5/16 inch, nominal.
 - 6. Finish: Factory applied topcoat.
 - 7. Color: As selected by Owner from manufacturers full range of available colors.
 - 8. Warranty: 50 year limited; transferable.
 - 9. Manufacturers:
 - a. Allura, a division of Plycem USA, Inc; .: www.allurausa.com/#sle.
 - b. Fiberon; Composite Cladding: www.fiberondecking.com/#sle.
 - c. James Hardie Building Products, Inc; .: www.jameshardie.com/#sle.
 - d. Nichiha USA, Inc; .: www.nichiha.com/#sle.

2.2 ACCESSORIES

- A. Trim: Same material and texture as siding.
- B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate minimum 1-1/4 inch.
- C. Exterior Soffit Vents: One piece, perforated, ASTM B221 (ASTM B221M), 6063 alloy, T5 temper, aluminum, with edge suitable for direct application to gypsum board and manufactured especially for soffit application, and provide continuous vent.
- D. Sealant: Elastomeric, polyurethane or silyl-terminated polyether/polyurethane, and capable of being painted.
- E. Finish Paint: Latex house paint acceptable to siding manufacturer; primer recommended by paint manufacturer. Contractor to use 09 90 00 – Painting and Coating as a basis of exterior paint selection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that weather barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Install Sheet Metal Flashing:
 - 1. Above door and window trim and casings.
 - 2. Above horizontal trim in field of siding.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
 - 1. Read warranty and comply with terms necessary to maintain warranty coverage.
 - 2. Use trim details indicated on drawings.
 - 3. Touch up field cut edges before installing.
 - 4. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
- C. Over Masonry Walls: Install furring strips of adequate thickness to accept full length of nails and spaced at 16 inches on center; leave space at top and bottom open; top may be behind soffit; at bottom install insect screen over opening by wrapping a strip of screen over bottom ends of vertical furring strips.
- D. Over Steel Studs: Use hot-dipped galvanized self-tapping screws, with the points of at least three screws penetrating each stud the panel crosses and at panel ends.
- E. Allow space for thermal movement between both ends of siding panels that butt against trim; seal joint between panel and trim with specified sealant.
- F. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- G. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.

- H. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on drawings, and provide vent area specified.
- I. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.

3.4 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07 46 46

SECTION 07 71 23 – MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS

- A. General: Gutters and downspouts shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

1.2 SUBMITTALS

- A. Submit product data for each type of product indicated in accordance with Section 01 33 00 – Contractor Submittals.
- B. Shop Drawings: show joints, types and location of fasteners, and special shapes.
- C. Catalog data for stock manufactured items.
- D. Samples: Color Samples for items to be factory finished.

1.3 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA 1793. Conform to dimensions and profiles shown, unless more stringent requirements are indicated.

1.4 DELIVERY, HANDLING, AND STORAGE

- A. Inspect for damage, dampness, and wet storage stains upon delivery to Site.
- B. Remove and replace damaged or permanently stained materials that cannot be restored to like-new location.
- C. Carefully handle to avoid damage to surfaces, edges, and ends.
- D. Do not open packages until ready for use.
- E. Store materials in dry, weathertight, ventilated areas until immediately before installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. Architectural Products Co.
- 2. ATAS International, Inc.
- 3. Berger Bros. Co.

4. Castle Metal Products.
5. OMG Roofing Products.
6. Metal-Era, Inc.
7. Metal-Fab Manufacturing LLC.
8. Petersen Aluminum Corp.
9. Or approved equal.

2.2 EXPOSED METALS

- A. Prefinished, Zinc-Coated Steel Sheet: ASTM A924, Grade A or ASTM A653, G90 zinc coating, commercial quality copper bearing steel, and prefinished by the coil-coating process to comply with ASTM A755, thickness 0.0239-inch (24 gauge), unless otherwise shown.
- B. Prefinished Aluminum Sheet: ASTM B209, alloy and temper as required for application and finish. Minimum 0.032-inch thick; finish; shop precoated with fluoropolymer coating (Kynar polyvinylidene fluoride resin) coating; color by Owner.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
- C. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- D. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 ROOF EDGE DRAINAGE SYSTEMS

- A. Gutters and Downspouts: Manufactured formed gutter in uniform section lengths not exceeding 12 feet, with mitered and welded or soldered corner units, end caps, outlet

tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front gutter rim. Furnish with flat-stock gutter straps and gutter support brackets and expansion joints and expansion-joint covers fabricated from same metal as gutters.

1. Fabricate gutter from the following exposed metal:
 - a. Prefinished, Zinc-Coated Steel: thickness as indicated on drawings.
2. Gutter Style: As indicated on drawings according to SMACNA's "Architectural Sheet Metal Manual."
3. Gutter Accessories: Continuous removable leaf screen with sheet metal frame.
4. Downspouts: Rectangular closed-face with mitered elbows, manufactured from the following exposed metal. Furnish wall brackets, from same material and finish as downspouts, with anchors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install manufactured roof specialties according to manufacturer's written instructions. Anchor manufactured roof specialties securely in place and capable of resisting forces specified in performance requirements. Use fasteners, separators, sealants, and other miscellaneous items as required to complete manufactured roof specialty systems.
 1. Install manufactured roof specialties with provisions for thermal and structural movement.
 2. Torch cutting of manufactured roof specialties is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
- C. Install manufactured roof specialties level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil-canning, buckling, or tool marks.
- D. Install manufactured roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
- E. Expansion Provisions: Provide for thermal expansion of exposed manufactured roof specialties. Space movement joints at a maximum of 12 feet with no unplanned joints within 18 inches of corners or intersections.
- F. Fasteners: Use fasteners of type and size recommended by manufacturer but of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

- G. Seal joints with elastomeric or butyl sealant as required by manufacturer of roofing specialties.

3.2 ROOF EDGE DRAINAGE SYSTEM INSTALLATION

- A. General: Install gutters and downspouts to produce a complete roof drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Gutters: Join and seal gutter lengths. Attach gutters to firmly anchored gutter brackets spaced not more than 24 inches apart. Slope gutters to downspouts.
 - 1. Install gutter with expansion joints at locations indicated but not exceeding 25 feet apart. Install expansion joint caps.
 - 2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide fasteners designed to hold downspouts securely; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

END OF SECTION 07 71 23

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:

- 1. Roof curbs.

1.2 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated.
- B. Shop Drawings: Show fabrication and installation details for roof accessories.

1.3 QUALITY ASSURANCE

- A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers listed in other Part 2 articles.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in other Part 2 articles.

2.2 METAL MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coated and mill phosphatized for field painting.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.

2.3 ROOF CURBS

- A. Roof Curbs: Provide metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1. Available Manufacturers:
 - a. Colony Custom Curbs.
 - b. Commodity Products Company, Inc.
 - c. Conn-Fab Sales, Inc.
 - d. Curbs Plus Inc.
 - e. Custom Curb, Inc.
 - f. LM Curbs.
 - g. Loren Cook Company.
 - h. Metallic Products Corporation.
 - i. Pate Company (The).
 - j. Roof Products & Systems Corporation.
 - k. Roof Products, Inc.
 - l. Thaler Metal Industries Ltd.
 - m. ThyCurb; Div. of Thybar Corporation.
 - n. Uni-Curb, Inc.
 - o. Vent Products Company, Inc.
2. Load Requirements: Coordinate with mechanical equipment.
3. Material: Galvanized or Aluminum-zinc alloy-coated steel sheet, 0.079 inch (2.0 mm) thick.
4. Liner: Same material as curb, of manufacturer's standard thickness and finish.
5. Factory install wood nailers at tops of curbs.
6. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
7. Factory insulate curbs with 1-1/2-inch- (38-mm-) thick, polyisocyanurate board insulation.
8. Curb height may be determined by adding thickness of roof insulation and minimum base flashing height recommended by roofing membrane manufacturer. Fabricate units to minimum height of 12 inches (300 mm), unless otherwise indicated.

9. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Install roof accessories to fit substrates and to result in watertight performance.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 1. Coat concealed side of uncoated aluminum or stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of HT ice and water shield underlayment and cover with a slip sheet.
 3. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.
- D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
- E. Seal joints with elastomeric or butyl sealant as required by manufacturer of roof accessories.

END OF SECTION 07 72 00



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SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install joint sealers shown on the drawings and as specified herein.

1.2 REFERENCE STANDARDS

- A. ASTM C834 – Specification for Latex Sealants
- B. ASTM C920 – Specification for Elastomeric Joint Sealants
- C. ASTM C1193 – Guide for Use of Joint Sealants
- D. ASTM C1248 – Test Method for Staining of Porous Substrate by Join Sealants
- E. ASTM C1521 – Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
- F. ASTM D2240 – Test Method for Rubber Property – Durometer Hardness

1.3 CONDITIONS

- A. Install elastomeric sealants when temperature is in lower third of temperature range recommended by manufacturer for installation.
- B. Except as otherwise indicated, joint sealers are required to establish and maintain waterproof continuous seals on a permanent basis, which recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

1.4 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specified product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.

4. Substrates the product should not be used on.
5. Substrates for which use of primer is required.
6. Installation instructions, including precautions, limitations, and recommended backing material and tools.
7. Warranties: See warranties as specified in this Section

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.
- C. Warranty:
 1. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this section within specified warranty period.
 - a. Warranty Period for Silicone Sealants: 20 years from Date of Substantial Completion.
 - b. Warranty Period for Polyurea Sealants: 1 year for Date of Substantial Completion.
 - c. Warranty Period for All other Types of Sealants: 5 years from Date of Substantial Completion.
 2. Include Coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Elastomeric Sealants
 1. Joints in Concrete Floors and Sidewalks: One component self-leveling polyurethane sealant conforming to ASTM C920, Type S, Grade P.
 2. Joints in Water Containing Structures and Intermittently Submerged Joints: Two component, non-sag, water immersion, polysulfide polymer based elastomeric sealant conforming to ASTM C920, Type M, Grade NS.
 - a. Joint sealants in contact with potable water must be NSF Certified.

3. Exterior Joints in Building Construction: One component, non-sag, SBR polymer based elastomeric sealant conforming to ASTM C920, Type S, Grade NS. Sealant color match substrate.
 - a. Seal open joints, whether or not the joint is indicated on Drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - 1) Wall expansion and control joints.
 - 2) Joints between door, window, storefront, and other frames and adjacent construction.
 - 3) Joints between different exposed materials.
 - 4) Openings below ledge angles in masonry.
 - 5) Masonry control and expansion joints.
4. Interior Joints in Building Construction: One component multipurpose silicone sealant conforming to ASTM C920, Type S, Grade NS. Color of sealant to match substrate. Translucent where color match is not available.
 - a. Seal interior joints unless specifically indicated not to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - 1) Joints between door, window, storefront, and other frames and adjacent construction.
 - 2) All joints between dissimilar materials.
5. Do not seal the following type of joints:
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
- B. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed; non-staining.
- C. Sealant Backer Rod: Provide compressible rod stock of polyethylene foam, polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable non-absorbent materials as recommended by sealant manufacturer for back-up of and compatibility with sealant. Oversize 30 to 50 percent larger than joint width.

PART 3 - EXECUTION

3.1 JOINT PREPARATION

- A. Clean joint surfaces immediately before installation of gaskets, sealants, or caulking compounds. Remove loose materials and foreign matter that could impair adhesion of sealant. Remove dirt, insecure coatings, moisture and other substrates which could interfere with seal. Prepare all joint surfaces as recommended by sealant manufacturer.
- B. Use primer on all surfaces as recommended by the product manufacturer. Use backer rod on all joints to control the depth of sealant application to manufacturer's recommended sealant depth.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

3.2 INSTALLATION

- A. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.
- B. Employ only proven installation techniques, which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. When horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove so that joint will not trap moisture and dirt.
- C. Perform installation in accordance with ASTM C1193.
- D. Seal all exposed joints of dissimilar materials and elsewhere as indicated.
- E. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- F. Install sealant free of air pockets, foreign embedded material, ridges, sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

- H. Seal bottoms of hollow metal frames to floor at resilient flooring.
- I. Seal thresholds in a full continuous bed of sealant.
- J. Spillage: Do not allow sealants or compounds to overflow from confines of joints, or spill onto adjoining work, or to migrate into voids of exposed finishes. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
- K. Recess exposed edges of gaskets and exposed joint fillers slightly behind adjoining surfaces, unless otherwise shown, so that compressed units will not protrude from joints.

3.3 CURE AND PROTECTION

- A. Cure sealants in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength, and surface durability. Advise Contractor of procedures required for cure and protection of joint sealers during construction period so that they will be without deterioration or damage (other than normal wear and weathering) at time of substantial completion. Cure and protect sealants in a manner which will minimize effects. Replace or restore sealants which are damaged during construction period.

3.4 POST OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that the joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION 07 92 00



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SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install non-fire-rated hollow metal doors and frames.
- B. Furnish and install fire-rated hollow metal doors and frames where indicated on the Drawings.
- C. Furnish and install thermally insulated hollow metal doors and frames.

1.2 REFERENCE STANDARDS

- A. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- C. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2025.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- E. ASTM A653/A653M- Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process, 2022a.
- F. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020a.
- G. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- I. ITS (DIR) - Directory of Listed Products; current edition.
- J. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.
- K. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- L. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- M. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

- N. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.
- O. UL (DIR) - Online Certifications Directory; Current Edition.
- P. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirement of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: www.steeldoor.org/sdicertified.php/#sle.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company; ____: www.assaabloydss.com/#sle.
 - 2. Curries, an Assa Abloy Group company; ____: www.assaabloydss.com/#sle.
 - 3. Republic Doors, an Allegion brand; ____: www.republicdoor.com/#sle.

4. Steelcraft, an Allegion brand; ____: www.allegion.com/#sle.
5. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL DOORS

- A. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum, hot dipped zinc, A60 coated that complies with ASTM A924 & ASTM A653 on both sides.
 2. Door Core Material: Polyurethane, 2.0 lbs/cu ft minimum density.
 - a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
 - b. Minimum R-value 2.5
 3. Door Thickness: 1-3/4 inches, nominal.
 4. Door Finish: Factory primed per SDI/DOOR A250.8 and field finished.
- B. Interior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.

- c. Model 1 - Full Flush.
- d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum, hot dipped zinc, A60 coated that complies with ASTM A924 & ASTM A653 on both sides.
- 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
- 3. Door Thickness: 1-3/4 inches, nominal.

2.4 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Exterior Door Frames: Face welded type.
 - 1. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum, hot dipped zinc, A60 coated that complies with ASTM A924 & ASTM A653.
 - 2. Frame Finish: Factory primed and field finished.
 - 3. Weatherstripping: Separate, see Section 08 71 00.
- C. Interior Door Frames, Non-Fire Rated: Face welded type.
 - 1. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
 - 2. Frame Finish: Factory primed and field finished.

2.5 FINISHES

- A. Primer: Factory primed per SDI/DOOR A250.8, door manufacturer's standard.
- B. Field finish: Finish coat per Section 09 90 00 – Painting and Coatings.

2.6 ACCESSORIES

- A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.
 - 1. Style: Standard straight slat blade.
 - 2. Fasteners: Exposed or concealed fasteners.
- B. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

- C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 08 71 00 – Door Hardware.

3.3 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.4 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION 08 11 13



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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flush wood doors, flush configuration, non-rated.
 - 2. Factory finishing

1.2 REFERENCE STANDARDS

- A. ANSI A208.1 – American National Standard for Particleboard
- B. AWI/AWMAC/WI (AWS) – Architectural Woodwork Standards
- C. AWMAC/WI (NAAWS) – North American Architectural Woodwork Standards, U.S. Version 3.0
- D. WDMA I.S. 1A – Interior Architectural Wood Flush Doors

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Indicate compliance with WDMA standards, door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
 - 1. Provide product data for adhesives and composite wood products, indicating that the product contains no added urea formaldehyde.
 - 2. Indicate dimensions and locations of mortises and holes for hardware.
 - 3. Indicate dimensions and locations of cutouts.
 - 4. Indicate requirements for veneer matching.
 - 5. Indicate doors to be factory finished and finish requirements.
- D. Samples: Submit two samples of door veneer, 8-1/2 by 11 inch in size illustrating wood grain, stain color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.

- F. Specimen Warranty.
- G. Warranty, executed in Owner's name.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Company specializing in the products specified in this sections with minimum 5 years of documented experience. Manufacturer to be certified for chain of custody by as FSC-accredited certification body
- B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A.
- C. Forest Certification: Provide doors made with not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.5 WARRANTY

- A. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, OR EQUAL

- A. Wood Veneer Faced Doors:
 - 1. Algoma Hardwoods
 - 2. Eggers Industries
 - 3. Lynden Door, Inc
 - 4. Marshfield DoorSystems, Inc
 - 5. Oregon Door
 - 6. Oshkosh Door Company
 - 7. Vancouver Door Company
 - 8. VT Industries

2.2 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain added urea formaldehyde. Third party certification for this testing is required.
- B. Doors: Refer to drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Extra Heavy Duty performance, in accordance with WDMA I.S. 1A.
 - 2. Wood Veneer Faced Doors: 5-ply. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
- C. Interior Doors: 1-3/4-inches thick; flush construction.
 - 1. Provide solid core doors at all locations.
 - 2. Wood veneer facing with factory transparent finish.

2.3 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Typical particleboard core (PC), ANSI A208.1, Grade LD-2, plies and faces as indicated above, made with binder containing no added urea-formaldehyde resin.
 - 1. Provide structural composite lumber core for full glazed doors.

2.4 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: White maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 - 1. Vertical Edges: Same species as face veneer.
 - 2. "Running Match" each pair of doors and doors in close proximity to each other.
 - 3. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.
- B. Facing Adhesive: Type I – Waterproof.

2.5 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Comply with requirements in NFPA 80 for fire-rated doors.
- C. Blocking: Provide minimum 5-inch top rail blocking for all doors with closers. Provide 5-inch bottom rail for auxiliary hardware and undercut flexibility.

- D. Stiles (Vertical Edges): Provide manufacturer's standard laminated edge construction with improved screw-holding capability and split resistance. Both inner and outer stiles cannot contain salt treating.
- E. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- F. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- G. Factory fit factory finished doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard except as follows:
 - 1. Clearances: Provide 1/8-inch at heads, jambs, and between pairs of doors. Provide 1/8-inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4-inch from bottom of door to top of threshold unless otherwise indicated.
- H. Bevel edges 1/8-inch in 2 inches at lock and hinge edges.
- I. Provide edge clearances in accordance with the quality standard specified.

2.6 FACTORY FINISHING – WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/MI (AWS) or AWMAC/MI (NAAWS), Section 5 – Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System 9 0 UV Curable, Acrylated Epoxy, Polyester or Urethane.
 - b. Stain: As selected by Owner.
 - c. Sheen: Semigloss.
- B. Factory finish doors in accordance with approved sample.

2.7 ACCESSORIES

- A. Hollow Metal Door Frames: As specified in Section 08 11 13.
- B. Glazing: As specified in Section 08 80 00.
- C. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws.
- D. Door Hardware: As specified in Section 08 71 00

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify existing conditions before starting work.
 - 1. Verify that opening sizes and tolerances are acceptable.
 - 2. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.
- B. Install doors in accordance with manufacturer's instructions and specified quality standard.
- C. Factory Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- D. Use machine tools to cut or drill for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.
- F. Coordinate installation of glazing.
- G. Comply with NFPA 80 for fire-rated doors.

3.2 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.
- C. Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
- D. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

3.3 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.
- C. Rehang or replace doors that do not swing or operate freely.
- D. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 33 23 – OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install overhead coiling doors, operating hardware, non-fire-rated and exterior, electrically operated with dimensions as indicated on the Drawings.
- B. Furnish and install wiring from electrical circuit disconnect to operator to control station.

1.2 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- B. ITS (DIR) - Directory of Listed Products; current edition.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- D. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2020).
- E. NEMA MG 1 - Motors and Generators; 2021.
- F. UL (DIR) - Online Certifications Directory; Current Edition.
- G. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. General: All submittals shall be in accordance with the requirements of Section 01 33 00-Submittal Procedures.
- B. Product Data: Provide general construction, electrical equipment, and component connections and details.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
 - 1. Provide summary of forces and loads on walls and jambs.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Color Selection Samples: Submit color samples representing manufacturer's full range of available colors to Owner for approval.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified.

1.5 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE 7.
 - 1. The term “withstand” means “the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified”.
 - 2. Seismic Component Importance Factor: As indicated on the Structural Drawings.
- B. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than the number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position. The minimum requirements for all rolling service doors is a standard maximum of 25 cycles per day and an overall maximum of 50,000 operating cycles for the life of the door.

1.6 WARRANTY

- A. Provide two-year manufacturer limited warranty for three-ply multifilament polyester fabric curtain.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Overhead Coiling Doors:
 - 1. Alpine Overhead Doors, Inc; .: www.alpinedoors.com/#sle.
 - 2. C.H.I. Overhead Doors: www.chiohd.com/#sle.
 - 3. Clopay Building Products: www.clopaydoor.com/#sle.
 - 4. Cornell Iron Works, Inc; .: www.cornelliron.com/#sle.
 - 5. Raynor Garage Doors: www.raynor.com/#sle.
 - 6. The Cookson Company: www.cooksondoor.com/#sle.

7. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.

2.2 COILING DOORS

- A. Exterior Coiling Doors: Steel slat curtain.
 1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
 2. Single thickness slats.
 3. Nominal Slat Size: 2 inches wide by required length.
 4. Finish: Galvannealed with factory applied Powder-Coat finish with color selected by owner.
 5. Guides, Formed Sheet Metal: Galvannealed steel.
 6. Hood Enclosure: Manufacturer's standard; primed steel.
 7. Electric operation.
 8. Mounting: Within framed opening.
 9. Standard slat construction with insulated core of foamed-in-place polyurethane insulation, minimum R-value of 8.1.

2.3 MATERIALS AND COMPONENTS

- A. Metal Curtain Construction: Hinged slats.
 1. Curtain Bottom for Panel-Slat Curtains: Extruded aluminum.
 2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
 3. Steel Slats: Minimum thickness, 18 gauge, 0.478 inch; ASTM A653/A653M galvannealed steel sheet.
 - a. Finish: Galvanneal with a minimum A60 coating with a Factory Applied Powder coat finish.
- B. Guide Construction: Continuous, of profile to retain door in place, mounting brackets of same metal.
- C. Guides - Sheet Metal: Formed from sheet metal, 16 gauge; 2 inch wide minimum.
 1. Hot-Dip Galvannealing: Minimum A60 coating, in compliance with ASTM A653/A653M.

- D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
 - 1. Finish: Factory applied Powder Coat Finish.
- E. Lock Hardware:
 - 1. For motor operated units, additional lock or latching mechanisms are not required.
- F. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.4 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
 - 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
 - 1. Mounting: Side mounted.
 - 2. Motor Enclosure:
 - a. Exterior Coiling Doors: NEMA MG 1, Type 4; open drip proof.
 - 3. Motor Rating: 1/2 HP; continuous duty.
 - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
 - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 6. Controller Enclosure: NEMA 250, Type 4.
 - 7. Opening Speed: 12 inches per second.
 - 8. Brake: Manufacturer's standard type, activated by motor controller.
 - 9. Manual override in case of power failure.
 - 10. Refer to Section 26 05 83 for electrical connections.
- C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
 - 1. 24 volt circuit.
 - 2. Surface mounted, at interior door jamb.

- 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
 - b. Classified Area Primary Device: Provide intrinsically safe electrical sensing edge control device.
- D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that opening sizes, tolerances, and conditions are acceptable.

3.2 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- 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 electrical service with Section 26 05 83.
- F. Complete wiring from disconnect to unit components.
- G. Install enclosure and perimeter trim.

3.3 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- 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 per 10 feet straight edge.

3.4 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean installed components
- B. Remove labels and visible markings.

END OF SECTION 08 33 23

SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install all hardware for wood and hollow metal doors, fire-rated doors, thresholds, weatherstripping and gasketing.

1.2 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; 2021.
- C. BHMA A156.2 - American National Standard for Bored and Preamsembled Locks & Latches; 2022.
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2024.
- E. BHMA A156.6 - American National Standard for Architectural Door Trim; 2021.
- F. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2023.
- G. BHMA A156.18 - American National Standard for Materials and Finishes; 2020.
- H. BHMA A156.21 - American National Standard for Thresholds; 2019.
- I. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems Sponsor; 2021.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- K. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- L. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- M. UL (DIR) - Online Certifications Directory; Current Edition.
- N. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Keying Requirements Meeting:

1. Schedule a keying meeting prior to securing and installing the door hardware.
2. Attendance Required:
 - a. Contractor.
 - b. Owner.
3. Agenda:
 - a. Establish keying requirements.
 - b. Verify locksets and locking hardware are functionally correct for project requirements.
4. Deliver established keying requirements to manufacturers.
5. Furnish keys in the following quantities:

Number of Keys	Type of Key
4 each	Master keys per set
2 each	Change keys each keyed core
6 each	Construction master keys
2 each	Control keys

1.4 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirement of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 2. Provide complete description for each door listed.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years of documented experience.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. All door hardware to be made of stainless steel or aluminum unless noted otherwise.
- C. Provide individual items of single type, of same model, and by same manufacturer.
- D. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.

2.2 HINGES

- A. Hinges: Comply with BHMA A156.1, Grade 1.
 - 1. Provide hinges on every swinging door.
 - 2. All hinges and pivots shall be of stainless steel unless otherwise specified.
 - 3. Provide ball-bearing hinges at each door with closer.
 - 4. Provide non-removable pins on exterior outswinging doors.
 - 5. Provide following quantity of butt hinges for each door:
 - a. Doors up to 60 inches High: Two hinges.
 - b. Doors From 60 inches High up to 90 inches High: Three hinges.
 - c. Doors 90 inches High up to 120 inches High: Four hinges.

2.3 FLUSH BOLTS

- A. Flush Bolts: Comply with BHMA A156.16, Grade 1.
 - 1. Flush Bolt Throw: 3/4 inch, minimum.
 - 2. All flush bolts shall be of stainless steel unless otherwise specified.
 - 3. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
 - a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.

4. Manual Flush Bolts: Provide lever extensions for top bolt at over-sized doors.

2.4 LOCK CYLINDERS

- A. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
 1. Provide cylinders from same manufacturer as locking device.
 2. Provide cams and/or tailpieces as required for locking devices.
 3. Permanent core face must be the same finish as the lockset finish.
 4. Provide locksets with Best 7-pin interchangeable core.

2.5 CYLINDRICAL LOCKS

- A. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 2, 4000 Series.
 1. Bored Hole: 2-1/8 inch diameter.
 2. Latchbolt Throw: 1/2 inch, minimum.
 3. Material: Stainless steel unless otherwise indicated.
 4. Backset: 2-3/4 inch unless otherwise indicated.
 5. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Finish: To match lock or latch.
 6. Provide a lock for each door, unless otherwise indicated that lock is not required.

2.6 TRIM:

- A. Provide Stainless Steel lever handle trim on outside of each lock, unless otherwise indicated.
- B. Keyed handle to be protected by means of a "Break-Away" mechanism to prevent forced entry.
- C. Provide Stainless Steel Door Pulls and Push Plates at Locker room doors.

2.7 CLOSERS

- A. Closers: Comply with BHMA A156.4, Grade 1.
 1. Type: Surface mounted to door.
 2. Provide door closer on each fire-rated and smoke-rated door.

- a. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.

3. At out swinging exterior doors, mount closer on interior side of door.

2.8 PROTECTION PLATES

- A. Protection Plates: Comply with BHMA A156.6.
 - B. Metal Properties: Stainless Steel.
 1. Metal, Standard Duty: Thickness 0.05 inch, minimum.
- C. Edges: Beveled, on four sides unless otherwise indicated.
- D. Fasteners: Countersunk screw fasteners.

2.9 ARMOR PLATES

- A. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
 1. Size: 16 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.
 2. Armor Plates shall be stainless steel unless otherwise noted.

2.10 KICK PLATES

- A. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
 1. Size: 8 inch high by 2 inch less door width (LDW) on push side of door.
 2. All kick plates shall be of stainless steel unless otherwise specified.

2.11 FLOOR STOPS

- A. Floor Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
 1. Type: Manual hold-open, with pencil floor stop.
 2. Material: Aluminum housing with rubber insert.

2.12 WALL STOPS

- A. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
 1. Type: Bumper, concave, wall stop.

2. Material: Aluminum housing with rubber insert.

2.13 THRESHOLDS

- A. Thresholds: Comply with BHMA A156.21.

1. Provide threshold at each exterior door, unless otherwise indicated.
2. Type: Flat surface.
3. Material: Aluminum.
4. Threshold Surface: Fluted horizontal grooves across full width.
5. Field cut threshold to profile of frame and width of door sill for tight fit.
6. Provide non-corroding fasteners at exterior locations.

2.14 WEATHERSTRIPPING AND GASKETING

- A. Weatherstripping and Gasketing: Comply with BHMA A156.22.

1. Head and Jamb Type: Adjustable.
2. Door Sweep Type: Encased in retainer.
3. Material: Aluminum, with neoprene weatherstripping.
4. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated; .
5. Provide door bottom sweep on each exterior door, unless otherwise indicated.

2.15 SILENCERS

- A. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.

1. Single Door: Provide three on strike jamb of frame.
2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
3. Material: Rubber, gray color.
4. Silencers NOT required on doors with weather seals.

2.16 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.

1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
2. Secondary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
 - a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.

PART 3 - EXECUTION

3.1 HARDWARE SCHEDULED

- A. The hardware schedule is arranged for convenience of locating hardware and does not preclude in any way the requirements that all necessary hardware shall be furnished and properly installed. Hardware not specifically called out shall be similar to that required for similar uses.

1. Hardware Set 1: Each single, exterior roll-up or sectional door shall be by door manufacturer. All related and necessary finish hardware items shall be provided by overhead door manufacturer as required for a complete, fully functional and waterproof door assembly installation.
2. Hardware Set 2: Each single, interior fire rated coiling door shall be by door manufacturer. All related and necessary finish hardware items shall be provided by overhead door manufacturer as required for a complete, fully functional and fire rated door assembly installation.

3. Hardware Set 3: Each single, exterior steel door shall have:

Quantity	Description
Per spec	Hinges
1	Lever Lockset Trim at Entrance
1	Interior panic bar
1 set	Surface closer
1	Seals & Wall Stop (provide both),
1	Door Threshold
1 pair	Kick plates
1	Door sweep
1	Drip, head

4. Hardware Set 4: Each double, exterior steel door shall have:

Quantity	Description
Per spec	Hinges

Quantity	Description
2	Lever Lockset Trim at Entrance
2	Interior panic bar
2 set	Surface closer
1	Seals & Wall Stop (provide both),
1	Door Threshold
2	Kick plates
1	Drip head
1	Bottom and top flush bolts on inactive door only
1	Door sweep

5. Hardware Set 5: Each single, interior door shall have:

Quantity	Description
Per spec	Hinges
1	Surface closer
1	Wall Stop
1	Lever Lockset Trim

6. Hardware Set 6: Each Single, exterior wood door shall have:

Quantity	Description
Per spec	Hinges
1	Surface closer
1	Wall Stop
1	Lever Lockset Trim
1	Door Sweep

7. Hardware Set 7: Each single, interior wood Locker Room door shall have:

Quantity	Description
Per spec	Hinges
1	Surface closer
1	Wall Stop
1	Door Pull & Push Plate

3.2 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Use templates provided by hardware item manufacturer.
- D. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
- E. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.3 ADJUSTING

- A. Adjust work under provisions of Section 01 77 00 - Closeout Procedures.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.4 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.

3.5 PROTECTION

- A. Protect finished Work under provisions of Section 01 77 00 - Closeout Procedures.
- B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION 08 71 00



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SECTION 08 80 00 – GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows
 - 2. Doors
 - 3. Glazed entrances
 - 4. Borrowed lites

1.2 REFERENCE STANDARDS

- A. 16 CFR 1201 – Safety Standard for Architectural Glazing Materials
- B. ANSI Z97.1 – American National Standard for Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test
- C. ASTM C920 – Specification for Elastomeric Joint Sealants
- D. ASTM C1036 – Specification for Flat Glass
- E. ASTM C1048 – Specification for Heat-Strengthened and Fully Tempered Flat Glass
- F. ASTM C1172 – Specification for Laminated Architectural Flat Glass
- G. ASTM C1193 – Guide for Use of Joint Sealants
- H. ASTM C1376 – Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass
- I. ASTM E2190 – Specification for Insulating Glass Unit Performance and Evaluation
- J. GANA (GM) – GANA Glazing Manual
- K. GANA (SM) – GANA Sealing Manual
- L. GANA (LGRM) – Laminated Glazing Reference Manual
- M. IGMATM-3000 – North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use

1.3 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirement of Section 01 33 00 – Submittal Procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical, and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Selection Samples: Provide manufacturer's full range of colors for glazing sealants and opacifier coating.
- E. Certificate: Certify that products of this section meet or exceed specified requirements.
- F. Warranty: See warranties as specified in this Section. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

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- B. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 - 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 3. Center-of-Glass Values: Based on using LBL-44189 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LRGM), IGMA TM-3000, and IGMA TB-3001 for glazing installation methods.
- B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance", and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
- C. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, coated float glass and insulating glass.
- D. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- E. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- F. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.

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1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of manufacturer acceptable to authorities having jurisdiction.
 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in area, provide glazing products that comply with Category II materials, and for lites 9 sq. ft. or less in area, provide glazing products that comply with Category I or II materials.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: GANA's "Glazing Manual."
 2. IGMA Publication for Insulating Glass: IGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
1. Insulating Glass Certification Council.
 2. Associated Laboratories, Inc.

1.7 WARRANTY

- A. Insulating Glass Units: Provide a five-year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- B. Laminated Glass: Provide a five-year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.
- C. Coated Glass: Provide a ten-year manufacturer warranty to include deterioration of coated glass including peeling, cracking, and other indications of deterioration of coating.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

- A. Heat-Treated Float Glass: ASTM C1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
 2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 3. For uncoated glass, comply with requirements for Condition A.
 4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- B. Pyrolytic-Coated Float Glass: ASTM C1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture and complying with other requirements specified.
- C. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 4. Sealing System: Dual Seal, with primary and secondary sealants as follows:

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a. Manufacturer's standard sealants.

5. Spacer Specifications: Manufacturer's standard spacer material and construction.

2.2 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and 'shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type 0 (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.3 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.4 MONOLITHIC FLOAT-GLASS UNITS

- A. Uncoated Clear Float-Glass Units: Class 1 (clear) Kind HS (heat-strengthened) float glass.
 - 1. Thickness: 6.0 mm.
- B. Coated Clear Float-Glass Units: Class 1 (clear) Kind HS (heat-strengthened) float glass.
 - 1. Thickness: 6.0 mm.
 - 2. Reflective Coating: Pyrolytic.
 - a. Color: Silver.

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- b. Location: Second surface.

2.5 INSULATING-GLASS UNITS

A. Passive Solar Low-E Insulating-Glass Units:

1. Available Products:

- a. AFG Industries, Inc.
- b. Ford Glass Division
- c. Guardian Industries, Inc.
- d. Hordis Brothers, Inc.
- e. PPG Industries, Inc.

2. Overall Unit Thickness and Thickness of Each Lite: 16 and 5.0 mm.

3. Interspace Content: Air.

4. Outdoor Lite: Class 1 (clear) float glass.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected
- F. Clean contact surfaces with appropriate solvent and wipe dry within maximum 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- G. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

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3.2 INSTALLATION

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM) and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, but not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.3 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass Manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

SECTION 08 91 00 - LOUVERS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work includes furnishing and installing fixed and operable louvers at the location and size shown on the drawings.

1.2 REQUIREMENTS

- A. Structural Performance: Provide exterior metal louvers capable of withstanding the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of louver components including blades, frames, and supports; noise or metal fatigue caused by louver blade rattle or flutter; or permanent damage to fasteners and anchors.
 - 1. Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. acting inward or outward.
- B. Air-Performance, Water-Penetration, and Air-Leakage Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units 48 inches wide by 48 inches high. Test units according to AMCA 500.
 - 1. Perform testing on unpainted, cleaned, degreased units.
 - 2. Perform water-penetration testing on louvers without screens.
- C. Weather Louver Effectiveness: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units for a 60 minute test in accordance with AMCA Standard 500-L-99, Wind Driven Rain Water Penetration Test.

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Shop Drawings: For louver units and accessories. Include plans; elevations; sections; and details showing profiles, angles, and spacing of louver blades. Show unit dimensions related to wall openings and construction; free area for each size indicated; profiles of frames at jambs, heads, and sills; and anchorage details and locations.
 - 1. For installed louvers and vents indicated to comply with design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Wiring Diagrams: Detail power, signal, and control systems for motorized adjustable louvers and differentiate between manufacturer-installed and field-installed wiring.

- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, alloy 6063-T5 or T-52.
- B. Aluminum Sheet: ASTM B 209 alloy 3003 or 5005 with temper as required for forming.
- C. Aluminum Castings: ASTM B 26/B alloy 319.
- D. Fasteners: Of same basic metal and alloy as fastened metal or 300 series stainless steel, unless otherwise indicated.
- E. Anchors and Inserts: Stainless steel.
- F. Provide stainless steel where shown.

2.2 MOTOR OPERATED LOUVERS

- A. Louver Construction and Operation: Provide combination dual blade adjustable louvers with extruded-aluminum frames and blades, and with operating mechanisms to suit louver sizes.
- B. Motor operation, with two-position, spring-return application (with power on, motor opens louver; with power off, spring closes louver); 110-V, 60-Hz motor; and limit switch wired for grounding; equipped as follows:
 - 1. Toggle switch mounted on louver frame, ready for wiring.
 - 2. Loose toggle switch and indicator light, ready for installation.
 - 3. Terminals for controlling devices.
- C. Dual-Blade, Drainable, and Adjustable Louvers: Fixed drainable blades and adjustable blades combined in single frame.
 - 1. Louver Depth: 4 inches
 - 2. Frame Thickness: 0.125 inch
 - 3. Fixed-Blade Thickness: 0.081 inch
 - 4. Adjustable-Blade Thickness: 0.081 inch.
 - 5. Blade Angle: 45 degrees.
 - 6. Performance Requirements: As follows:

- a. Maximum Standard Airflow: Not less than 6850 cfm with not more than 0.15 inch wg static pressure loss.
- b. Air Leakage: Not more than 1.5 cfm per sq. ft. of louver gross area at a differential static pressure of 0.15 inch wg with adjustable louver blades closed.
- c. Minimum percent free area of louver: 35

2.3 SCREENS

- A. General: Provide each exterior louver with louver screens complying with the following requirements:
 - 1. Screen Location for Fixed Louvers: Interior face
 - 2. Screen Location for Adjustable Louvers: Exterior face
- B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate screen frames with mitered corners to louver sizes and to comply with the following requirements:
 - 1. Metal: Same kind and form of metal as indicated for louver to which screens are attached.
 - a. Reinforce extruded-aluminum screen frames at corners with clips.
 - 2. Finish: Same finish as louver frames to which louver screens are attached.
 - 3. Type: Non-rewirable, U-shaped frames for permanently securing screen mesh.
 - 4. Louver Screening for Aluminum Louvers: Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.

2.4 FINISH

- A. All louvers shall be finished with a full strength Kynar 500 fluoro-coating. Color to be selected by the Engineer from Manufacturer's standard color chart. All steel shall be thoroughly cleaned, etched and given a chromate conversion pretreatment before the application of an epoxy baked-on prime coat. The subsequent top finish color coating shall have a minimum baking cycle of 450° F for 20 minutes and shall be no less than 0.8 mils thick. All finishing procedures shall be one continuous operation and take place in the plant of the manufacturer. There shall be no checking, peeling, or caulking.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place louver units level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses, to provide weather-tight louver joints. Use proper sealants during louver installation.

END OF SECTION 08 91 00

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install gypsum drywall ceilings and walls over Wood framing as shown on the Drawings and as specified herein.

1.2 REFERENCE STANDARDS

- A. QQ-W-461H Wire, Steel, Carbon {Round, Bare, and Coated}
- B. ANSI A108.11 – Specifications for Interior Installation of Cementitious Backer Units
- C. ASTM A118.9 – Specifications for Test Methods and Specifications for Cementitious Backer Units
- D. ASTM B211 – Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire
- E. ASTM C475 – Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
- F. ASTM C514 – Specification for Nails for the Application of Gypsum Board
- G. ASTM C645 – Specification for Nonstructural Steel Framing Members
- H. ASTM C754 – Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
- I. ASTM C840 – Specification for Application and Finishing of Gypsum Board
- J. ASTM C919 – Standard Practice for Use of Sealants in Acoustical Applications
- K. ASTM C1002 – Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
- L. ASTM C1047 – Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
- M. ASTM C1177 – Specification for Glass Mat Gypsum Substrate for Use as Sheathing
- N. ASTM C1178 – Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel
- O. ASTM C1280 – Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing

- P. ASTM C1325 – Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units
- Q. ASTM C1396 X – Specification for Gypsum Board
- R. ASTM C1629 – Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
- S. ASTM D226 – Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
- T. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in and Environmental Chamber
- U. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- V. GA-214 – Recommended Levels of Gypsum Board Finish
- W. GA-216 – Application and Finishing of Gypsum Board
- X. GA-253 – Application of Gypsum Sheathing
- Y. GA-600 – Fire Resistance and Sound Control Design Manual

1.3 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirement of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Provide data on gypsum board indicating material composition, thickness, sizes, and fire resistance. Provide data on glass mat faced gypsum board, accessories, joint finishing system,

Product Data: Provide data on DensArmor Plus Gypsum board, and provide information on thickness, sizes, fire resistance, accessories, and joint finishing systems.
 - 1. Indicate profiles and products for wall and ceiling trim accessories
- C. Shop Drawings: Indicate fastener and adhesive patterns for FM wind uplift resistance. Indicate special details associated with acoustic sound isolation clips.
- D. Certification: Submit manufacturer’s written certification that product meets specified fire resistance requirements.
- E. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five-years of experience.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Labeling: All materials shall be delivered to the project site with manufacturer's labels intact and legible. Fire-rated materials shall bear testing agency labels and required fire classification numbers.
- B. Assemblies:
 - 1. Provide completed assemblies complying with ASTM C840 and GA-216.

2.2 DENSARMOR PLUS

- A. Composition: Provide DensArmor Plus gypsum board. Each panel shall have nominal size of 4 feet by 8 feet dimensions and shall have a minimum 5/8-inch thickness. Gypsum board shall conform to ASTM C1658 standards for Type X
- B. Fire Resistance: Provide gypsum ceiling panels with Flamespread "0", smoke developed "0", when tested in accordance with ASTM E84. Panels shall be non-combustible when tested in accordance with ASTM E136.
 - 1. Firestop Type X: Provide UL Classified Type X when tested in accordance with ASTM E119 where specified.
- C. Contact adhesives with hydrocarbon-based solvents require extended open time for solvent vapor evaporation when used with expanded and extruded polystyrene and when adhered to gypsum panels.
- D. Mold resistance: score of "10" or less, when tested in accordance with ASTM D3273.
- E. Moisture-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
- F. Manufacturers or Equal
 - 1. Georgia-Pacific

2.3 ACCESSORIES

- A. Metal trim, corner beads, edge, casing beads, and accessories shall be manufactured from galvanized sheet steel unless otherwise specified or shown and shall be manufacturer's standard products. Special shapes shall be provided where specified or shown.

- B. Tape and Compound: Provide materials complying with ASTM C475, ASTM C840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.
 - 1. Joint Tape: Paper reinforcing tape, unless otherwise indicated. Use pressure sensitive or staple-attached open-weave glass fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated
 - 2. Drying-Tape Joint Compounds: Factory-prepackaged vinyl-based products complying with the following requirements for formulation and intended use. Use all-purposed compound formulated for use as both taping and topping compound
- C. Fasteners: Nails shall conform to ASTM C514, and shall be of the length recommended by the Gypsum Association referenced standards and the Building Code for various gypsum board thickness. Nails for nailing tile backing board to wood studs shall be 1-1/4-inch galvanized roofing nails unless otherwise required by code, and board manufacturer. Screws shall be self-drilling, self-tapping, bugle head for use with power tools, Length as recommended by Gypsum Association referenced standards and the building code.
 - 1. Type “5” for wallboard to sheet metal application
 - 2. Type “W” for wallboard to wood application
 - 3. Type “8” for wallboard to wallboard application
- D. Adhesives: Adhesives for fastening gypsum board to gypsum board shall be in accordance with the printed recommendations of the gypsum board manufacturer.
- E. Corner Bead and Edge Trim: Metal trim, corner beads, edge, casing beads, and accessories shall be manufactured from galvanized sheet steel unless otherwise specified or shown and shall be manufacturer's standard products. Special shapes shall be provided where specified or shown.
- F. Metal Support Materials: Furring channels shall be ASTM C645, 25-gauge Hat shaped channels.
- G. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness to fit wall cavity, unless otherwise specified.
- H. Acoustic Sealant: As specified in Section 07 92 00 – Joint Sealants.

PART 3 - EXECUTION

3.1 GENERAL

- A. Verify that project conditions are appropriate for work of this section to commence. Start of wall and ceiling system Work will indicate acceptance of surfaces and conditions within each area.

- B. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- C. Provide gypsum panels on drawings using fastening system specified.
- D. Use maximum lengths possible to minimize number and joints. Locate edge joints parallel to and located on deck ribs. Stagger end joints of adjacent lengths panel.
- E. Gypsum wallboard shall be applied first to ceiling and then to walls. Wall application shall be horizontal (right angles to framing), or vertical (parallel to framing), conforming to reference standards.
- F. All gypsum board shall be nail or screw fastened to metal framing and furring. Fastener spacing shall be per reference standards.
- G. Installation of steel framing shall be in accordance with ASTM C754 and code.

3.2 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to the job site in manufacturer's original packaging, containers and bundles with manufacturer's brand name and identification intact and legible.
- B. Storage and handling: Storage and handle materials to protect against contact with damp and wet surfaces, exposure to weather, breakage and damage to edges. Provide air circulation under covering and around stacks of materials.

3.3 INSPECTION

- A. Check framing for accurate spacing and alignment. Verify that spacing of installed framing does not exceed maximum allowable for thickness of wallboard to be used. Do not proceed with installation until deficiencies have been corrected.

3.4 COORDINATION

- A. Coordinate with mechanical and electrical sections for the installation of their work in drywall construction.

3.5 CEILING INSTALLATION

- A. Place boards with long dimension at right angles to supports and end joints occurring over supports. Perimeters of ceilings and edges of openings shall be placed over solid members.

3.6 FASTENERS

- A. Place fasteners not less than 3/8-inch from edges of boards except when using washers or clips with fasteners in joint. Install when using washers or clips with fasteners in joint. Install fasteners with heads dimpled slightly below surface but not so deep as to cut through paper. Use approved type power tools for self-drilling screws. Obtain final set by turning screw down, not by driving. Space fasteners along all abutting edges and ends occurring over supports and in field at 12 inches on center. Stagger fasteners along common joints.

3.7 TRIM

- A. Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.
- B. Install corner beads at external corners.
- C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound except where "U" bead (semi-finishing type) is indicated.
 - 1. Install "LC" bead where drywall construction is tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
 - 2. Install "LK" bead where substrate is kerfed to receive long flange of trim.
 - 3. Install "L" bead where edge where edge trim can only be installed after gypsum board is installed
 - 4. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

3.8 FINISHING OF DRYWALL

- A. Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects and elsewhere as required to prepare work for decoration.
- B. Prefill open joints and rounded or beveled edges, if any, using setting-type joint compound.
- C. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.
- D. Finish: Interior gypsum wallboard shall be finished to a "Level 4" finish.
 - 1. Two separate coats of joint compound shall be applied over all flat joints.
 - 2. One Separate coat of joint compound shall be applied over interior angles.
 - 3. Fastener heads and accessories shall be covered with three separate coats of joint compound.
 - 4. Surface shall be Smooth and free of tool marks.
- E. Unless otherwise specified, all gypsum board shall be sanded smooth, dusted, and provided with an orange peel finish coat. Gypsum board at non-visible locations, such as within attics, finish shall be "Level 1" as required for fire protection.

END OF SECTION 09 29 00

SECTION 09 65 00 – RESILIENT FLOORING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide vinyl composition flooring, resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.2 RELATED SPECIFICATION SECTIONS

- A. 09 65 13 – Resilient Base and Accessories

1.3 REFERENCE STANDARDS

- A. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- B. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- C. ASTM F1066 – Standard Specification for Vinyl Composition Floor Tile
- D. ASTM F1516 – Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)
- E. ASTM F1861 – Standard Specification for Resilient Wall base
- F. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
- G. ASTM F2169 – Standard Specification for Resilient Stair Treads
- H. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

- I. NFPA 253 – Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
- J. RFCI (RWP) – Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute

1.4 SUBMITTALS

- A. General: All submittals shall be submitted in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Provide Data on specified products, describing physical and performance characteristics; including sizes, patterns, and colors available; and installation instructions.
 - 1. Provide product data for adhesives, including printed statement of VOC content and chemical compounds.
- C. Shop Drawings: Indicate seaming plans and floor patterns.
- D. Selection Samples: Submit manufacturer's complete set of color samples for Owner's initial selection for moldings and transition strips.
- E. Verification Samples: Submit two samples, 8 by 8 inch in size illustrating color and pattern for each resilient flooring product specified.
- F. Concrete Testing Standard: Submit a copy of ASTM F710.
- G. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
 - 1. Extra Flooring Material: 50 square feet of each type and color.
 - 2. Extra Wall Base: 10 linear feet of each type and color.

3. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color.
4. Maintenance Products: One year's annual required maintenance products of type recommended by flooring manufacturer.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store all materials off of the floor in an acclimatized, weather-tight space.
- B. Maintain temperature in storage area between 55 degrees Fahrenheit and 90 degrees Fahrenheit.
- C. Protect roll materials from damage by storing on end.
- D. Do not double stack pallets.

1.7 PROJECT CONDITIONS

- A. Store materials for not less than 72 hours prior to installation in an area of installation at a temperature of 70 degrees Fahrenheit to establish stability. Thereafter, maintain conditions above 68 degrees Fahrenheit.
- B. Moisture Testing: Maintain temperatures and humidity expected during normal use for testing. If this is not possible, then the test conditions should be 75+/- 10 degrees Fahrenheit and 50+/- 10 percent relative humidity. Maintain these conditions 48 hours prior to and during testing.
- C. Close spaces to traffic during resilient flooring installation and for time period after installation recommended in writing by flooring manufacturer.
- D. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.

PART 2 - PRODUCTS

2.1 TILE FLOORING LUXURY VINYL TILE (LVT)

- A. Approved Manufacturers, or equal:
 - 1. Mannington Mills, Inc.; Brushwork.
- B. Minimum Requirements: Vinyl composition tile complying with ASTM F10666, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
- E. Thickness: 0.125 inch.
- F. Size: 12 by 12 inches.
- G. Colors and Patterns: To be selected by Owner from manufacturer's full range.

2.2 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset, top set Style B, Cove
 - 1. Approved Manufacturers, or Equal:
 - a. Burke Flooring
 - b. Flexco, Inc
 - c. Johnsonite, a Tarkett Company
 - d. Roppe Corp
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 3. Height: 4 inches
 - 4. Thickness: 0.125 inch

5. Finish: Satin
6. Length: Roll
7. Color: To be selected by Owner from manufacturer's full range.

2.3 ACCESSORIES

- A. Subfloor Filler: Portland cement based; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
 1. VCT, Vinyl, and Seam Sealer: Use adhesives that have a VOC of not more than 50g/L.
 2. Rubber Floor Adhesives: Use adhesives that have a VOC of not more than 60g/L.
- C. Moldings, Transition, and Edge Strips: Rubber.
 1. Provide transitions and edge strips at all exposed edges of resilient flooring, carpet, and entry mat and at transitions from one material to another.
 - a. Color as selected by Owner from manufacturer's full range of available colors.
 2. Integral-Flash-Cove-Base Accessories:
 - a. Cove Strip: 1-inch radius provided or approved by manufacturer.
 - b. Cap Strip: Square metal cap provided or approved by manufacturer.
 3. Floor Polish: Provide protective liquid floor wax/polish products as recommended by manufacturer.
 - a. Application of protective wax/polish by owner.

Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.
- E. Install resilient flooring material and accessories after other finishing operations, including painting, have been completed.

3.2 PREPARATION

- A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI (RWP).
- B. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
- C. Concrete Substrates: Prepare according to ASTM F710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform the following tests: Proceed with installation only after substrates pass testing.
 - a. Anhydrous calcium chloride test, ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 pounds of water per 1000 square feet in 24 hours. Limit maximum moisture-vapor-emission rate to 5 pounds of water per 1000 square feet in 24 hours for linoleum.
 - b. Perform additional tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- D. Relative Humidity Testing: Perform testing of relative humidity in concrete slabs for field tests in accordance with ASTM F2170.
 1. The relative humidity measured from the center of the concrete slab should not exceed 75 percent.
- E. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- F. Prohibit traffic until filler is fully cured.
- G. Do not install coverings until they are the same temperature as space where they are to be installed.
 1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- H. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.3 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- D. Lay out floor coverings as follows:
 - 1. Maintain uniformity of floor covering direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
 - 3. Match edges of floor coverings for color shading at seams.
 - 4. Avoid cross seams.
- E. Extend all floor coverings into toes spaces, door reveals, closets, and similar openings.
- F. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- G. Spread only enough adhesive material to permit installation of materials before initial set.
- H. Fit joints and butt seams tightly.
- I. Set flooring in place, press with heavy roller to attain full adhesion.
- J. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- K. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.

- L. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- M. At movable partitions, install flooring under partitions without interrupting floor pattern.

3.4 INSTALLATION – TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
- C. Lay tiles square with room axis, unless otherwise indicated. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures.
 - 1. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- F. Install square tile to quarter turn pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

3.5 INSTALLATION – RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.

- D. Scribe and fit to door frames and other interruptions.

3.6 INSTALLATION – ACCESSORIES

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece.
 - 1. Install reducer strips at edges of resilient flooring, carpet, and entry mat that would otherwise be exposed.
 - 2. Install transition strips at joints between one material to another.

3.7 CLEANING AND PROTECTION

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.
- C. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Perform initial maintenance on installed products in accordance with manufacturer's instructions, prior to Owner's acceptance. Remove construction site debris from project site and legally dispose of debris.
 - 1. Remove visible adhesive and other surface blemishes using cleaning methods recommended by manufacturer.
 - 2. Sweep vacuum floor after installation.
 - 3. Do not perform initial maintenance for a minimum of 5 days after installation has been completed to allow the adhesive the proper time to set.
 - 4. Damp mop flooring to remove black marks and soil.
- D. Prohibit traffic on resilient flooring for 48 hours after installation.
- E. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- F. Cover floor coverings until Substantial Completion.

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END OF SECTION 09 65 19

RESILIENT FLOORING

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SECTION 09 65 00 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install rubber wall base where LVT is shown on the contract drawings as specified herein..

1.2 REFERENCE STANDARDS

A. Federal Standards

- 1. SS-W-40A Wall Base: Notice 1 Rubber, and Vinyl Plastic. Int Amd 1

B. Commercial Standards

- 1. ASTM D570 Test Method for Water Absorption of Plastics
- 2. ASTM D638 Test Method for Tensile Properties of Plastics
- 3. ASTM E84 Test Method for Surface Burning

- C. Manufacturer's Standards: In addition to the standards listed above, the resilient flooring products and their installation shall be in accordance with the manufacturer's published recommendations and specifications.

1.3 SUBMITTALS

- A. Submit the following product data in accordance with Section 01 33 00 – Submittal Procedures:

- 1. Manufacturer's literature or cut sheet on each component of system
- 2. Maintenance instructions
- 3. Color and style selection

- B. Samples: Color and texture samples shall be submitted to the Engineer for review. The samples shall be clearly marked to show the manufacturer's name and product identification.

1.4 QUALITY CONTROL

- A. Environmental Conditions - Maintain 70 degrees Fahrenheit minimum during application.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Unless otherwise specified, install sheet vinyl in areas indicated on the drawings.
- B. The Owner shall select the color and texture from the manufacturer's full range of materials within each category specified. More than one color or texture of each material may be selected for application.
- C. Accessory materials which are necessary for proper installation and for problem areas shall be as recommended or specified in the manufacturer's published specifications and installation instructions.

2.2 MATERIALS

- A. Top Set Base: Top-set base shall be 1/8-inch thick by 4 inches high (unless otherwise shown) rubber cove base or non-cove base at soft flooring, conforming to Federal Specifications SS-W-40A, Int. Amd. 1, Notice 1, with matching factory-formed corner units. Top set base shall be from products of Burke Flooring Products, Roppe Corporation, or equal.
- B. Fillers and Levelers: Floor filling and leveling materials shall be as recommended by the flooring material manufacturers, for the job conditions.
- C. Adhesives & Primer: Adhesives and primer shall conform to Federal Specifications-MMM-A-1110B(1) Int. Amd. 2, and be approved by the manufacturer of the floor covering or wall base being used. The adhesive shall be resistant to both alkali and moisture and shall be capable of securely holding the floor covering or wall base firmly in place and hermetically sealing and binding the joints.
- D. Extra Materials: Leave box 5% extra material of type and color used on Project with Owner for replacement use.

PART 3 - EXECUTION

3.1 GENERAL

- A. All materials, including primer, fillers, and adhesives, and all installation procedures shall be as recommended by the manufacturer.
- B. The manufacturer's published recommendations and specifications shall be followed for accessory materials, installation, and problem areas.

3.2 PRODUCT, DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken packages, containers, or bundles, bearing the name of the manufacturer.

- B. Storage: All materials shall be carefully stored as recommended by the manufacturer in an area that is protected from the elements. Storage shall be in a manner that will prevent damage to the products and marring of their finishes.

3.3 SURFACE PREPARATION

- A. The Contractor's installer shall perform such additional operations as necessary to overcome any latent condition adversely affecting the installation. Surfaces accepted by the installer for their work shall become their entire responsibility. It shall be the Installer's responsibility to ensure that no noticeable variation in the finish plane of the completed installation exists.

3.4 INSTALLATION

- A. Base: Base shall be installed in full standard lengths and piecing will not be allowed. End stops and internal and external corner pieces shall be pre-formed. Base shall be left free of buckles and bulges. There shall be no gaps at top and bottom. It shall have a solid backing so that it cannot be pushed in by chairs or other objects.

3.5 CLEANING

- A. Cleaning: Just prior to acceptance of the project the wall base shall be thoroughly cleaned satisfying the printed recommendations of the manufacturer.

END OF SECTION 09 65 00



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SECTION 09 90 00 – PAINTING AND COATING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, materials and equipment as required for all painting and coatings as specified herein. All materials, equipment, piping and miscellaneous surfaces shall be coated except for those indicated under Part 1.7. Work includes but is not to be limited to cleaning and preparation of surfaces, paint materials, and the application of all paint and other materials. Provide third party inspection of surface preparation, application and testing of coating and painting during application.
- B. Provide coatings for pipe identification as specified in Section 40 05 97 – Piping Identification.
- C. Any painting or coating in contact with potable drinking water, or water that will become potable drinking water, shall be NSF61 Certified.

1.2 DEFINITIONS

- A. The term paint, coatings, or finishes as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and all other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.
- B. Dry Film Thickness (DFT): The minimum dry film thickness, without any negative tolerance.
- C. Submerged Metal: Steel or iron surfaces below tops of channel or structure walls which will contain water even when above expected water level.
- D. Submerged Concrete and Masonry Surfaces: Surfaces which are or will be:
 - 1. Underwater.
 - 2. Inside structures which normally contain water.
 - 3. Below tops of walls of water containing structures.
- E. Exposed Surface: Any metal or concrete surface, indoors or outdoors that is exposed to view.
- F. Volatile Organic Compound (VOC): Content of air polluting hydrocarbons in uncured coating product measured in units of grams per liter or pounds per gallon, as determined by EPA Method 24.
- G. Ferrous: Cast iron, ductile iron, wrought iron, and all steel alloys except stainless steel.

- H. Where SSPC surface preparation standards are specified or implied for ductile iron pipe or fittings, the equivalent NAPF surface preparation standard shall be substituted for the SSPC standard.

1.3 REFERENCE STANDARDS

- A. Codes and Standards: In addition to the requirements of these Specifications, the work to be performed under this Section is to comply with the following codes and regulations:

1. The Society of Protective Coatings Specifications (SSPC):

a.	SSPC SP-1	Solvent Cleaning.
b.	SSPC SP-2	Hand Tool Cleaning.
c.	SSPC SP-3	Power Tool Cleaning.
d.	SSPC SP-5	White Metal Blast Cleaning.
e.	SSPC SP-6	Commercial Blast Cleaning.
f.	SSPC SP-7	Brush-Off Blast Cleaning.
g.	SSPC SP-10	Near-White Blast Cleaning.
h.	SSPC SP-11	Power Tool Cleaning to Bare Metal.
i.	SSPC-SP-12	High- and Ultrahigh-pressure Water Jetting.
j.	SSPC-SP-13	Surface Preparation of Concrete
k.	SSPC-SP-16	Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals

2. Underwriters' Laboratory (UL):

a.	UL 3P83	Drinking Water System Components - Health Effects.

3. National Association of Corrosion Engineers Standards (NACE):

a.	RP0188-06	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

4. Applicable Standards of American National Standards Institute, Inc. (ANSI)

5. National Association of Pipe Fabricators (NAPF):

a.	NAPF 500-03	Surface Preparation Standard for Ductile Iron Pipe and Fittings Receiving Special External Coatings and/or Special Internal Linings.

6. American Society for Testing and Materials (ASTM):
 - a. ASTM D4262 Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
 - b. ASTM D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - c. ASTM D4285 Test Method for Indicating Oil or Water in Compressed Air.
 - d. ASTM D4541 Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.

1.4 QUALITY ASSURANCE

- A. Pre-Application Conference: Prior to commencement of any paint application, the Engineer will hold an on-site pre-application meeting. The purpose of meeting is to establish a working understanding between all parties and to discuss items that pertain directly to the paint application.
- B. Painter's Qualifications: The work specified under this Section shall be performed by or under the supervision of a qualified painter. The Contractor shall be required to document the painter's experience, competence and ability to comply with the requirements of these Specifications and to complete the work in a timely manner. The Painter or Applicator shall have the following qualifications:
 1. Minimum of 5 years of experience applying specified type or types of coatings under conditions similar to those of the Work. Provide qualifications of applicator and references listing five similar projects completed in the past two years.
 2. Manufacturer approved applicator when manufacturer has approved applicator program.
- C. Coatings Inspection: Surface preparation, mixing, thinning, coating application, and measurement of dry film thicknesses shall be performed by a NACE Certified Coatings Inspector. Each requirement of this specification shall be met and approved by the Inspector prior to moving on to the next step in the progression of the coating's specification.
- D. Standard Products: All paints in a paint system are to be the standard products. All products applied in any paint and coating system shall be from a single manufacturer.
- E. The NACE Inspector must approve all surface preparation prior to the application of coatings. This will include surface cleanliness, the degree of sandblast and surface profiles.

- F. At a minimum of every four hours or more often when conditions change during surface preparation and coatings application, environmental conditions IE: Relative Humidity, dew-point, surface temperature and the dew-point/surface temperature depression must be measured and recorded. The use of a sling psychrometer and US weather bureau barometric chart or approved equal such as Defelsko or Elcometer test instruments shall be used to measure the environmental conditions.
- G. Warranty Inspection: A warranty inspection will be conducted at the end of the one-year warranty period from the substantial completion date. The Contractor and a representative of the coating material manufacturer may attend this inspection. All defective work shall be repaired in accordance with these specifications and to the satisfaction of the Owner. The Owner may, by written notice to the Contractor, reschedule the warranty inspection to another date within the warranty period.
- H. Quality Assurance Responsibility: The Contractor is responsible to obtain and pay for the services of the NACE inspector referred to above.

1.5 SUBMITTALS

- A. Before any paint materials are delivered to the job site, submit a complete list of all materials proposed to be furnished and applied under this Section. Include schedule of where and for what use coating materials are proposed in accordance with requirements for Product Data. Any coating or paint materials ordered by Contractor prior to receiving submittal response from Engineer indicating that the submitted material is accepted shall be at the risk of the Contractor.
- B. For each paint, furnish the paint manufacturer's specific application instructions and the following information:
 - 1. Paint manufacturer's data sheet for each product proposed, including statements on the suitability of the materials for the intended use.
 - 2. Surface preparation recommendations
 - 3. Type of primer, if required
 - 4. Maximum dry and wet mil thickness per coat
 - 5. Minimum and maximum curing time between coats, including atmospheric conditions for each
 - 6. Curing time before submergence in water
 - 7. Thinner to be used with each paint
 - 8. General ventilation requirements
 - 9. Atmospheric conditions during which the paint is not to be applied
 - 10. Allowable methods of application

11. Maximum allowable moisture content and minimum age of plaster, concrete and wood surfaces at time of paint application
 12. Compatibility of shop and field applied coatings (where applicable)
 13. For coating in contact with potable water, provide NSF61 Certification
- C. Reports: Submit the following to the Engineer:
1. Reports on visits to project site to view and approve surface preparation of structures to be coated.
 2. Reports on visits to project site to observe and approve coating application procedures.
 3. Reports on visits to coating plants to observe and approve surface preparation and coating application on items that are "shop coated."

1.6 DELIVERY AND STORAGE

- A. Deliver, store, and handle products in accordance with manufacturer's requirements. All materials are to be delivered to the job site in their original, unopened containers bearing the manufacturer's name, brand, batch number, date of manufacture, and any special directions.
- B. Only the approved material shall be stored at the job site and stored only in designated areas restricted to the storage of paint materials and related equipment. All paint is to be stored in enclosed structures and protected from weather and excessive heat or cold. Store coatings in well-ventilated facility that provides protection from the sun, weather, and fire hazards. Maintain ambient storage temperature between 45- and 90-degrees Fahrenheit, unless otherwise recommended by the manufacturer.
- C. Store flammable materials to conform with State and local safety codes. Protect emulsion type paints from freezing. Take precautions to prevent fire and spontaneous combustion.
- D. Materials exceeding storage life recommended by the manufacturer will be subject to rejection.
- E. Remove unspecified and unapproved paints from Project site immediately

1.7 SURFACES NOT REQUIRING PAINTING

- A. Nonferrous and corrosion-resistant ferrous alloys such as copper, bronze, aluminum, chromium plate, and weathering steel, except where (1) required for electrical insulation between dissimilar metals, (2) aluminum is in contact with concrete or masonry, and (3) color coding of equipment and piping is required.
- B. Copper, bronze, aluminum, weathering steel, and stainless steel,
- C. Glass, porcelain, and plastics do not require painting.

- D. Prefinished architectural finishes such as acoustical tile, cabinets, and wall panels do not require painting.
- E. Prefinished electrical items such as motor control centers, switchboards, switchgear, panelboards, transformers, and disconnect switches do not require painting.
- F. Exposed electrical conduits shall be painted to match the color of the adjacent wall or equipment to which they are attached, except that non-submerged conduits attached to unpainted masonry and concrete surfaces need not be painted.
- G. Exterior concrete slabs, exterior sidewalks, exterior concrete stairs and exterior concrete curbs.
- H. Platform gratings, stair treads, door thresholds, and other walk surfaces, unless specifically indicated to be coated.

1.8 MAINTENANCE

- A. Extra Materials: Include minimum 1 gallon of each type and color of coating applied. When manufacturer packages material in gallon cans, deliver unopened labeled cans as comes from factory. When manufacturer does not package material in gallon cans, deliver material in new gallon containers, properly sealed and identified with typed labels indicating brand, type and color.

PART 2 - PRODUCTS

2.1 PAINT AND COATING SYSTEM APPLICATIONS

- A. Prepare surfaces and apply paint and coating systems in accordance with the following schedules for all surfaces.

Surface Preparation	Description
SSPC SP-1	Solvent Cleaning
SSPC SP-2	Hand Tool Cleaning
SSPC SP-3	Power Tool Cleaning
SSPC SP-5	White Metal Blast Cleaning
SSPC SP-6	Commercial Blast Cleaning
SSPC SP-7	Brush off Blast Cleaning
SSPC SP-10	Near White Blast Cleaning
SSPC SP-11	Power Tool Cleaning to Bare Metal
SSPC SP-12	High- and Ultrahigh-Pressure Water Jetting
SSPC SP-13	Surface Preparation of Concrete

SSPC SP-16	Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals
C-1	Abrasive blast clean in accordance with ASTM D4259 and fill all holes and imperfections with Sika Mono Top 615.

NOTE TO SPECIFIER: Consult Tnemec Rep for use of Systems 18, 19, 20, and 21 to get appropriate coating for applications.

Paint and Coating Application Schedule		
Surface to be Painted or Coated	Surface Preparation	Paint System
Ferrous Metal (ungalvanized), Exposed	SSPC – SP-6	System 1
Ferrous Metal (galvanized)	SSPC – SP-1	System 2
Ferrous Metal, Submerged or Buried	SSPC – SP-10	System 3
Ferrous Metal, Exposed Inside Tankage	SSPC – SP-10	System 3
Ferrous Metal, Buried (galvanized)	SSPC – SP-6	System 5
Ferrous Metal, Buried (black)	NAPF 500-03-04	System 5
Concrete Block (CMU), Exterior Surfaces, all buildings	Manufacturer's Inst.	System 4
Concrete Floors	SSPC SP-13, ICRI 310.2R, CSP 2-3 or Manufacturer's Inst.	System 18

- B. Coatings for Structure C4 are indicated on the Drawings.

2.2 PAINT AND COATING SYSTEMS

- A. Furnish primers and finish coatings as shown on the following coating table schedule. If manufacturers have changed their coating products and the products shown below are no longer available, provide the product that the manufacturer recommends as the improved version of the product shown.
- B. Where dry film thicknesses are not shown, the DFT shall be as recommended by the manufacturer for the product and service shown in the Application Schedules above.

C. Paint and Coating Systems:

NOTE TO SPECIFIER: Consult with local coating rep to get recommended coating in specific areas of project.

System	Sherwin Williams	ICI Devco Coatings	Tnemec Company
1	Macropoxy 646 FC Primer 3-6 mdf, 2 coats HS Polyurethane	MultiPrime/Devguard 4160 primer Devguard 4308 finish (4550) finish 2 coats, 3.0 mils each	Tnemec 66 primer Tnemec 2H finish 2 coats, 3.0 mils each
2	SHER-CRYL HPA 2 coats, 3-4 mils each	Same as System 1 Devco Coatings but use Devguard 4120 primer	Same as System 1 but pretreat galvanizing
3	SHER-GLASS FF 2 coats, 8-10 mdf/coat	Catha-Coat 302H primer Devtar 5A finish 8.0 mils	Tnemec N69 8 mils primer Tnemec HS Epoxy 104 10 mils finish
5	Macropoxy 646FC 2 coats, 8-10 mdf/coat	Bar Rust 235, 2 coats & 20 mils PVC Wrap	Tnemec HS Epoxy 104, 2 coats 10 mils & 20 mils PVC Wrap
18	Resuprime 3579 Resulofr 3746 General Polymers 3746	Preprime 167/Devran 124	Primer Series 201 4 mils Series 282 finish, 2 coats, 6 mils each

2.3 OTHER COATINGS

- A. Factory Applied Coatings and Touchup: Field touchup shall consist of touching up the shop prime coat to achieve the film thickness, continuity and coating specified in accordance with the paint system data sheets. Badly damaged shop coatings shall be removed and the surfaces recoated in accordance with the specified system requirements.
- B. Aluminum Metal Insulation: Where aluminum surfaces come in contact with concrete or with metals not compatible with aluminum, paint the dissimilar materials with a prime coat of zinc-chromate primer or a coating of heavy-bodied bituminous paint.
- C. Painting and Identification of Piping: All exposed new piping is to be painted and identified in accordance with Section 40 05 97 – Piping Identification.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Prepare all surfaces prior to application of paint or coatings. Comply with surface preparation requirements of the Society for Protective Coatings (SSPC). If the paint or coating manufacturer recommends a surface preparation different than that shown, follow the more stringent surface preparation requirement.
- B. ASTM D4259 – Wet Abrasive Blasting, Vacuum Assisted Dry Abrasive Blasting or Centrifugal Shot Abrasive Blasting
 - 1. Shot Blasting – Before blasting fill defects and holes with filler recommended by the coating manufacturer. Blast with dustless steel shot to remove laitance, residue and loose material to roughen the surface to a texture of No. 40 to 60 grit sandpaper.
- C. Surface preparation requirements of the Society for Protective Coatings (SSPC) are as follows:
 - 1. SSPC – SP-1 – Solvent Cleaning
 - 2. SSPC – SP-2 – Hand Tool Cleaning
 - 3. SSPC – SP-3 – Power Tool Cleaning
 - 4. SSPC – SP-5 – White Metal Blast Cleaning
 - 5. SSPC – SP-6 – Commercial Blast Cleaning
 - 6. SSPC – SP-13 – Mechanical or Chemical Cleaning
- D. Preparation of Concrete and Masonry Surfaces: Unless otherwise specified, concrete surfaces which are to receive any paint coating shall be allowed to age for a minimum of 28 days. Moisture content shall be tested with a Delmhorst Instrument Company moisture detector prior to application of paint or coating. The moisture content of the concrete shall be within the limits recommended by the manufacturer of the paint or coating before any paint or coating is applied.

3.2 APPLICATION

- A. Workmanship: All work shall be done in a workmanlike manner so that the finished surface will be free from runs, drips, ridges, waves, laps and unnecessary brush marks. All coats shall be applied in such a manner as to produce an even film of uniform thickness, completely coating all corners and crevices.
- B. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in a first-class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Spray equipment shall be equipped with mechanical agitators, pressure gauges, and pressure regulators. Spray nozzles shall be of the proper sizes.

- C. Each coat of paint shall be applied evenly and sharply cut to line. Care shall be exercised to avoid overspraying or spattering paint on surfaces not to be coated. Glass, hardware, floors, roofs and other adjacent areas and installation shall be protected by taping, drop cloths or other suitable measures.
- D. Paint Properties, Mixing and Thinning. All paint, when applied, shall provide a satisfactory film and smooth, even surface. Glossy undercoats shall be lightly sanded to provide a surface suitable for the proper application, adhesion and subsequent coats. Paints shall be thoroughly stirred, strained and kept at a uniform consistency during application. Coatings consisting of two (2) or more components shall be mixed in accordance with manufacturer's instructions. Where necessary to suit conditions of the surface, temperature, weather and method of application, and with the Engineer's approval, the paint may be thinned immediately prior to use by the addition of not more than one pint per gallon of the proper thinner; provided that in no case shall the paint be reduced more than necessary to obtain the proper application characteristics. Where specifically permitted by the Specifications, certain paints may be thinned more than the maximum indicated above. Paint thinner shall be as recommended by the paint manufacturer.
- E. Atmospheric Conditions: Except as specified or required for certain water-thinned paints, paints shall be applied only to surfaces that are thoroughly dry and only under such combination of humidity and temperatures of the atmosphere and surfaces to be painted as will cause evaporation rather than condensation.
 - 1. In no case shall any paint be applied during rainy, misty weather, or to surfaces upon which there is frost or moisture condensation without suitable protection, as accepted by the Engineer. Where painting is permitted during damp weather or when the temperature is at or below 40 degrees F, the surfaces shall be heated to prevent moisture condensation thereof.
 - 2. Bar metal surfaces, except those which may be warped by heat, may be dehydrated by flame-heating devices immediately prior to paint application.
 - 3. While any painting is being done and for a period of at least eight (8) hours after the paint has been applied, the temperature of the surfaces to be painted, the painted surfaces and the atmosphere in contact therewith shall be maintained at or above 40 degrees F and 5 degrees above the dew point.
 - 4. All paint, when applied, shall be approximately the same temperature as that of the surface on which it is applied. The use of fans or heaters shall be required in enclosed areas where conditions causing condensation are severe.
- F. Method of Paint Application: Where two (2) or more coats are required, alternate coats shall contain sufficient compatible color additive to act as indicator of coverage, or the alternate coats shall be of contrasting colors. Color additives shall not contain lead or any lead compound which may be destroyed or affected by hydrogen sulfide or any gas likely to be found in wastewater treatment plants.
- G. Electrical and mechanical equipment, on which the manufacturer's coating is found, shall be touch-up primed and painted with two (2) coats of the specified paint system to match the color scheduled. This does not apply to electrical and instrumental equipment otherwise specified in Division 26.

- H. No paint shall be applied to any surface until it has been prepared as specified and approved by the Engineer. Unless otherwise specified, the primer or first coat of paint shall be applied by brush to ferrous surfaces. All subsequent coats for all ferrous surfaces may be either brush or spray applied. Unless stated otherwise, prime and finish coats shall be applied at the rate recommended by the manufacturer for the services involved. After prime coat is dry, all suction spots shall be touched up before succeeding coats are sprayed. All coats for concrete and masonry shall be brushed or rolled unless otherwise specified. Before painting or repainting existing surfaces, the Contractor shall test-paint a small area on the actual surface to show that the color matches the existing surfaces.
- I. Unless otherwise specified, do not apply finish coats until all other work in the area is done and until the prime and intermediate coats have been inspected by the Engineer.
- J. Film Thickness and Continuity: The actual surface area covered per gallon of oil and varnish vehicle paint for various types of surfaces shall not exceed those recommended by the manufacturer. All paint and coating thickness stated in this specification are dry film thickness. The first coat on metal surfaces refers to the first full paint coat and not to conditioning or other pretreatment applications. All coatings shall be applied to the thickness in accordance with these Specifications. The minimum thickness at any point shall not deviate more than 25 percent from the required average. Except as specified, no less than two (2) coats shall be applied.
- K. Special Requirements: Hangers shall be painted, except for the final coat, prior to installation. Paint underside of all ungalvanized equipment bases and supports with at least two (2) coats of rust inhibiting primer prior to setting the equipment in place. Paint bolt and bolt holes in flanges, such as those used with couplings or wagger type valves, where hold and bolt as finally installed will be exposed to weather or moisture, prior to assembly to prevent rusting of the unprotected metal.

3.3 FIELD INSPECTION AND TESTING

- A. Where two (2) or more coats are required, alternate coats shall contain sufficient compatible color additive to act as indicator of coverage, or the alternate coats shall be of contrasting colors.
- B. Unless otherwise specified, do not apply finish coats until all other work in the area is done and until the underlying coats have been inspected and accepted by the NACE Inspector.
- C. Film Thickness: All paint and coating thickness stated in this specification are dry film thickness. The first coat on metal surfaces refers to the first full paint coat and not to conditioning or other pretreatment applications. All coatings shall be applied to the thickness in accordance with these Specifications and the Manufacturer's recommendations as stated in the product data sheets. The dry film thickness of each coating application will be measured using the SSPA-2 standard. The minimum/maximum thickness requirements shall meet the perimeters outlined in this standard. Where the minimums and maximums do not meet the requirements of this standard, corrections must be made.
- D. Continuity: Holiday testing will be performed in accordance with NACE RP0188. All surfaces below the waterline shall be tested.

In testing for continuity, all pinholes and holidays located shall be repainted to the required dry film thickness. All ferrous metal surfaces shall meet minimum continuity requirements outlined the NACE RP0188 standard. All holiday repairs will be re-tested following the repairs.

- E. It is intended that the dry film thickness and the continuity of painted ferrous metal surfaces be subject to continual field check by the Contractor's quality control subcontractor. Dry-film thickness will be measured by an Elcometer or Mikrotest magnetic type dry-film thickness gauge. Continuity will be tested by a low voltage wet sponge transistorized device, as manufactured by Tinker-Rasor (Model M-1), or equal. The Contractor's quality control subcontractor shall use inspection devices that are in good working condition for detection of holidays and measurement of dry-film thickness. The Contractor's subcontractor shall also furnish U.S. Department of Commerce, National Bureau of Standards certified thickness calibration plates to test accuracy of dry-film thickness gauge and certified instrumentation to test accuracy of holiday detectors. Provide safe and suitable ladders or temporary scaffolding and adequate illumination to facilitate inspection.

3.4 PROTECTION OF PAINT SURFACES

- A. Where protection is provided for painted surfaces, such protection shall be preserved in place until the paint film has properly dried and the removal is authorized. Items which have been painted shall not be handled, worked on, or otherwise disturbed until the paint coat is completely dry and hard.
- B. After delivery at the site of materials for permanent erection or installation, all shop-coated metalwork shall be repainted or retouched from time to time, which specified paint, whenever, in the opinion of the Engineer, it becomes necessary to maintain the integrity of the film.

3.5 CLEANUP

- A. Upon completion of all painting, remove all surplus materials, protective coverings and accumulated rubbish and thoroughly clean all surfaces and repair any overspray or other paint-related damage.

END OF SECTION 09 90 00



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SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install all gypsum board including surface preparation and the application of paint systems on the following gypsum board.
- B. Application of paint systems on concrete or CMU walls as indicated in the finish schedule.

1.2 SUBMITTALS

- A. Submit product data for each type of product indicated in accordance with Section 01 33 00 – Submittal Procedures.
- B. Samples: For each finish and for each color and texture required.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent of those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coat.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material
 - 2. Product description (generic classification or binder type)
 - 3. Manufacturer's stock number and date of manufacturer
 - 4. Contents by volume, for pigment and vehicle constituents
 - 5. Thinning instructions
 - 6. Application instructions
 - 7. Color name and number
 - 8. VOC content

- B. Store materials not used in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect form freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.5 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.6 EXTRA MATERIALS

- A. Extra materials may not be allowed for publicly funded projects.
- B. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer's Name
 - 1. Benjamin Moore
 - 2. Sherwin Williams

2.2 PAINT, GENERAL

- A. Material Compatibility
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As indicated in drawings.

2.3 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

2.4 LATEX PAINTS

A. Interior Latex (Flat): MPI #53 (Gloss Level 1).

B. Interior Latex (Satin): MPI #43 (Gloss Level 4).

C. Interior Low Luster Epoxy Enamel: Factory Formulated low luster epoxy enamel.

1. As recommended for wet and kitchen prep areas by Benjamin Moore, Sherwin Williams, or Equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 INTERIOR PAINTING SCHEDULE

A. Gypsum Board Substrates:

- 1. Latex System: MPI INT 9.2A.
 - a. Prime Coat: Interior latex primer matching topcoat.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex satin.
- 2. Low Luster Epoxy Finish: Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior low luster epoxy enamel.
- 3. High-Performance Architectural Latex System: MPI INT 9.2B.
 - a. Prime Coat: Interior latex primer/sealer.
 - b. Intermediate Coat: High-performance architectural latex matching topcoat.
 - c. Topcoat: High-performance architectural latex semigloss.

B. Spray Ceiling Substrates:

- 1. Latex (Flat) System: MPI INT 9.1A, spray applied.
 - a. Prime Coat: Interior latex primer (flat).
 - b. Topcoat: Interior latex (flat).

END OF SECTION 09 91 23

SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish and install identification, warning and safety signs as shown on the drawings and as specified herein.
- B. The Contractor shall furnish and install nameplates for buildings and rooms as specified herein.
- C. The Contractor shall install a bronze plaque as specified herein.

1.2 REFERENCE STANDARDS

- A. Provide 1910-OSHA code standard signs where applicable.
- B. Regulatory Requirements: Provide signage in accordance with Americans with Disabilities Act as published in the Federal Register, Volume 56, No. 144, Friday, July 26, 1991.

1.3 SUBMITTALS

- A. Shop Drawings: The Contractor shall provide shop drawings of all signs in accordance with the requirements of Section 01 33 00 – Submittal procedures.
- B. Submit catalog cuts and schedule of proposed fastening system for each sign.
- C. Shop Drawing shall consist of full-size layouts of all signs and plaques. Repetitive sign layouts of typical and most restrictive conditions shall be submitted. Details of installation shall be submitted showing fasteners and mountings. Style and color of lettering shall be as selected by the Owner from the manufacturer's standards.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Identification devices shall be installed where indicated by the Engineer. All wording shall be as indicated and shall be verified and approved before fabrication.

2.2 EQUIPMENT SIGNAGE

- A. Lift Stations:
 - 1. Every lift point attached to a joist shall be provided with a sign indicating the lifting capacity in pounds with the words "Lifting Capacity".

2. Every hoist shall have a lifting capacity painted on the hoist in three-inch high letters.

B. Equipment Nametags

1. A stainless steel plate shall be attached to all equipment with lettering embossed into the plate. Lettering shall be the equipment number in the contract documents. Method of attachment shall be as recommended by the signage supplier.
2. Large equipment may have lettering stenciled directly onto the equipment, in letter size and color determined by the Engineer. Furnish the proposed wording to the Engineer for approval.

2.3 WARNING SIGNS

A. Warning Signs shall be enamel painted on semi-rigid butyrates. Signs shall conform to OSHA standards and directions. Lettering sizes shall be 3-inch in height unless indicated otherwise. Provide the following warning signs:

1. No Smoking Sign: 8" x 10" white background with red letters "NO SMOKING" on 20-gauge steel. Signs shall be located in areas which contain flammable or combustible materials.
2. Equipment Warning Sign: Signs shall be 10" x 12" yellow reflectorized sheeting background with non-reflectorized black screened legend. Sign shall read "CAUTION - THIS MACHINE STARTS AUTOMATICALLY". Mount sign on each side of the machine in a conspicuous place at approximately 64 inches above the floor. Provide one sign for each machine which can be started either automatically or remotely.
3. Exit Sign: Install an "EXIT" sign on the interior side of all exterior doors and interior doors that are means of egress in accordance with the building code.
4. High Voltage Warning: Install warning signs that read "DANGER HIGH VOLTAGE KEEP OUT" on front and back of equipment, adjacent to doors to rooms containing devices, and devices that operate at 600 volts or greater.
 - a. Warning Labels: Warning labels shall be installed on designated facilities such as, but not limited to control panels and washdown or blow-off hydrants on water trucks, hose bibs, and temporary construction services.

B. Provide Chemical Building signage as specified below and per applicable 2025 OSSC requirements. All signs to be plastic with clear protective polyester coating and shall be included with hardware as necessary for mounting in specified locations. Signs to be as manufactured by Emedco or equal.

1. The following signs shall be provided on all access doors to the chemical room in Process Building A.
 - a. DANGER HAZARDOUS CHEMICALS

- b. NFPA Hazardous material sign.
- 2. Provide NFPA chemical hazard label and product identification signage on each chemical tank.
- 3. Provide chemical identification signs at the entrance to each chemical secondary containment area. The signs shall be chemical information signs containing the information for the chemical stored and associated hazards of each area.
- 4. Provide a Single right-to-know information station sign for location of the Material Safety Data Sheets. Locate the sign per the Engineer's direction in the MSDS area for the chemical room in Process Building A.
- 5. Provide one sign above each chemical fill connection outside the chemical room in Process Building A. The chemical of each fill line shall be clearly marked and easily visible. Each sign shall be a chemical information sign containing the information of the chemical transported and associated hazards.

2.4 NAMEPLATES

- A. Each room shall have a nameplate attached to each door entrance. Nameplates shall be Builders Brass Works, 460 Series; Vomar Products, Inc., ES 100 Series; or equal, with colored 1/8-inch acrylic plastic (matte finish) raised 1/32-inch. Lettering shall be white, 1/2-inch high, or 48 points, and fused by heat and pressure to a depth of approximately 0.005-inch. Provide Grade 2 Braille underneath lettering. Plates to be installed in an extruded aluminum frame, medium bronze or dark anodized finish, and furnished with 2-way adhesive mounting tape. Plastic color and letting style shall be as selected by the Owner.
- B. Room nameplates shall be located 60" above floor on wall outside room adjacent to latch side of doors or when not enough space on latch side, on nearest adjacent wall.
- C. Room nameplates shall include room number and room name as indicated in drawings.

PART 3 - EXECUTION

3.1 GENERAL

- A. All installation of identifying devices shall be vandal-resistant. Fasteners shall be concealed, non-corrosive fasteners appropriate for materials being fastened and as required.

3.2 PREPARATION

- A. Protect adjacent surfaces which may be damaged by installation of signs.
- B. Prepare substrates in accordance with signs manufacturer's instructions.
- C. Remove scale, dirt, grease, and other contaminants from substrates.

3.3 INSTALLATION

- A. Install signs in accordance with sign manufacturer's instructions.
- B. Fasten signs securely in level, plumb, and true to plane positions.

END OF SECTION 10 14 00

SECTION 10 28 00 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install toilet accessories as shown on the drawings and specified herein.

1.2 REFERENCE STANDARDS

- A. Manufacturer's Standards: The toilet and bath accessories and their installation shall be in accordance with the manufacturer's published recommendations and specifications.

1.3 SUBMITTALS

- A. Product Data: Submit Manufacturer's literature and cut sheet in accordance with Section 01 33 00 – Submittal Procedures.
- B. Shop Drawings: Submit schedule showing items used, location where installed and proper attaching devices for substrate.

PART 2 - PRODUCTS

2.1 GENERAL

- A. For the purpose of establishing quality and type, all catalog numbers have been taken from the manufacturer catalogs, unless otherwise specified. All items furnished shall be products of the same manufacturer, wherever possible.
- B. Mounting locations shall be where shown, or at manufacturers recommended heights where not shown, and where determined by the Owner.
- C. All exposed exterior finish shall be satin finish stainless steel, except where otherwise specified.

2.2 SCHEDULE

- A. Toilet Tissue Dispensers

	<u>Men's</u>	<u>Women's</u>
1. A & J	Model U806B	Model U815-42
2. ASI	Model 0264-1A	Model 0697-GAL
3. Bobrick	Model B2740	Model B2840
4. Bradley	Model 5241-50	Model 5263

5.	Gamco	Equal	Model SPH-2
6.	McKinney	Model 1031DLCD	Model 2233LAT
- B. Single Robe Hook with Exposed Fasteners:
- | | | |
|----|----------|--------------|
| 1. | A & J | Model UX110B |
| 2. | ASI | Model 7340B |
| 3. | Bobrick | Model B-671 |
| 4. | Bradley | Model 9114 |
| 5. | Gamco | Model 5153B |
| 6. | McKinney | Model 1444 |
- C. Mirrors: Provide glass with stainless steel channel frame in size shown on drawings.
- | | | |
|----|----------|------------------|
| 1. | A & J | Model U711 |
| 2. | ASI | Model 0620 |
| 3. | Bobrick | Model B-165 |
| 4. | Bradley | Model 710 Series |
| 5. | Gamco | Model C Series |
| 6. | McKinney | Model 190 Series |
- D. Grab Bars: Concealed mount, 18-gauge, type 304 stainless steel, 1-1/2-inch diameter, and non-slip finish in configuration shown on drawings.
- E. Liquid Soap Dispensers: Bobrick B-116 (wall mounted) or equal.

2.3 APPROVED MANUFACTURERS

- A. A & J Washroom Accessories, New Windsor, NY (914) 562-3332
- B. ASI – American Specialties Inc., Yonkers, NY (914) 476-9000
- C. Bobrick Washroom Equipment Inc., North Hollywood, CA (818) 982-9600
- D. Bradley Corp, Mount Laurel, NJ (414) 354-0100
- E. GAMCO – General Accessory Manufacturing Co., Dallas, TX (800) 451-5766
- F. McKinney/Parker, Scranton, PA (800) 541-1073

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install items in accordance with Manufacturer's instructions. Provide mounting devices proper for base structure.
- B. Where possible, mount like items in adjoining compartments back-to-back on same partition.
- C. Locate as shown on drawings if location is indicated or as specified below:

END OF SECTION 10 28 00



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SECTION 10 44 16 - FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish and install all fire extinguishers, cabinets and appurtenant Work, as shown on the Drawings, specified herein, and as needed for a complete and proper installation, in accordance with the requirements of the Contract Documents.

1.2 REFERENCE STANDARDS

- A. Supply extinguishers that satisfy the Uniform Fire Code (UFC) as published by the Western Fire Chiefs Association Inc., the International Conference of Building Officials and the National Fire Protection Association publications (NFPA), as referenced herein.
 - 1. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Manufacturer's Standards: In addition to the standards listed above, the fire protection products and their installation shall be in accordance with the manufacturer's published recommendations and specifications.

1.3 CONTRACTOR SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures. Manufacturer's literature, installation instructions, and details shall be submitted.
- B. Shop Drawings: Clearly indicate dimensions, capacity, anchorage, construction details and method of installation.

1.4 QUALITY ASSURANCE

- A. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- B. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.
- C. Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.
 - 1. Coordinate sizes and locations of fire protection cabinets with wall depths.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
- B. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All fire prevention equipment shall be from the same manufacturer unless otherwise specified and shall meet the requirements of NFPA -Pamphlet No. 10.

2.2 EXTINGUISHER AND CABINET

- A. Fire Extinguisher: Provide extinguisher in locations indicated on drawings. Provide 5-pound ABC fire extinguisher with minimum UL rating of 2A:10B:C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International Ltd.
 - c. Badger Fire Protection; a Kidde company.
 - d. Buckeye Fire Equipment Company.
 - e. Fire End & Croker Corporation.
 - f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - h. Larsen's Manufacturing Company.
 - i. Moon-American.
 - j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
 - k. Potter Roemer LLC.
 - l. Pyro-Chem; Tyco Safety Products.
2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B
- B. Fire Extinguisher Cabinet: Provide factory prefinished steel cabinets as manufactured by Fire End & Croker Corporation, Modern Metal Products, Potter-Roemer Inc., or equal, as follows:

1. Semi-recessed or surface mounted cabinet with acrylic bubble window in door.
 2. Equip with full tempered float glass aluminum framed door with satin clear anodized finish.
 3. Cabinet finish shall be manufacturer's standard white.
 4. The size shall be as necessary to hold fire extinguisher specified or shown at cabinet location.
- C. Schedule: Provide a fire extinguisher and cabinet as indicated in the drawings.
- D. Bracket: Mounting brackets shall be strap-on type, specially designed for extinguisher.
- E. Other Materials: All other materials not specifically described but required for a complete and proper installation of firefighting devices shall be as selected by the Contractor subject to the review of the Engineer.

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials: Manufactured materials shall be delivered in original unbroken packages, or containers, bearing the manufacturer's label with manufacturer's name, product description, and rating.
- B. Storage: All materials shall be carefully stored in an area which is protected from deleterious elements as recommended by the material manufacturer. Storage shall be in a manner that will prevent damage to the material and its finish.

3.2 INSPECTION

- A. Contractor shall thoroughly examine all substrates, areas and conditions under which installation work of this Section is to be undertaken. Contractor shall not proceed with Work until satisfactory conditions have been corrected.
- B. Starting of installation work will be construed as Contractor's acceptance of substrates, surfaces and conditions within any particular area.

3.3 INSTALLATION

- A. Brackets: All fire extinguishers shall be provided with and installed on brackets or brackets within cabinets. The Contractor shall block and reinforce wall to support the fire extinguishers.
- B. Locations: Fire extinguishers shall be mounted at between 3 and 5 feet above finished floor. Locations shall be verified with the Engineer and Fire Marshall before installation and shall be installed in locations as indicated on the Drawings and where directed per NFPA Pamphlet No.10.

- C. Each fire extinguisher shall be serviced, charged and tagged not more than five calendar days prior to the Date of Substantial Completion as that date is determined by the Engineer.

END OF SECTION 10 44 16

SECTION 10 51 14 – LOCKER ROOM BENCHES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish and install locker room benches and all appurtenant work, all in accordance with the requirements of the Contract Documents.

1.2 REFERENCE STANDARDS

- A. Provide benches that satisfy all applicable codes as specified in Section 01 42 19 - Reference Standards.
- B. Benches shall comply with ADA standards when required.

1.3 SUBMITTALS

- A. Shop Drawings: The Contractor shall provide shop drawings of all products in accordance with the requirements in Section 01 33 00 – Submittal Procedures.
- B. The following shall be submitted for Owner review and approval:
 - 1. Materials of construction
 - 2. Finishes
 - 3. Manufacturer's standard colors
 - 4. Manufacturer catalog layout drawings showing elevation views and dimensions

PART 2 - PRODUCTS

2.1 GENERAL

- A. Benches shall be manufactured by Scantron Products, Salsbury Industries, Columbia Lockers, Summit Lockers, or equivalent. All benches shall be supplied from the same manufacturer.
- B. Colors shall be selected by the Owner from manufacturer's standard colors. Color and finish shall match lockers if applicable, unless otherwise specified.
- C. Shop drawings and color selections shall be submitted for each product.
- D. Provide maintenance costs for products submitted, to include typical repair and painting costs for each product over the 25 year warranty period. Provide manufacturer's 25 year warranty against breakage, corrosion, and delamination under normal conditions.

2.2 BENCHES

- A. Benches dimensions shall meet the following requirements:
 - 1. Height: 16 to 18 inches
 - 2. Width: 9 inches, or 12 inches to comply with ADA standards
 - 3. Bench tops: 1 to 1-1/2 inches thick with all edges rounded to a 1/4 inch radius
 - 4. Length: as shown on plans and not to exceed 96 inches for one single piece.
- B. Unless noted otherwise, benches shall be made of HDPE plastic and pedestals shall be made of steel or aluminum. Substitutions permitted with prior approval of engineer.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

- A. Inspect benches upon receipt for visible damage. Further inspection if necessary for hidden damage.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Sequence deliveries to avoid project delays but minimize on-site storage.

3.2 INSTALLATION

- A. Benches shall be fastened to the structures in accordance with manufacturers printed recommendations and in conformance with applicable codes. Floor and wall penetrations shall be coordinated with structural plans.
- B. Install benches rigid, straight, plumb, and level. No evidence of drilling, cutting, and patching shall be visible in finished work.

END OF SECTION 10 51 14

SECTION 10 56 13 - METAL STORAGE SHELVING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall construct metal storage shelving and all appurtenant work, in accordance with the requirements of the Contract Documents.

1.2 REFERENCE STANDARDS

- A. Provide and install storage shelving per applicable codes, as referenced herein, in Section 01090 - Reference Standards.

1.3 SUBMITTALS

- A. Shop Drawings: The Contractor shall provide shop drawings of all shelving in accordance with the requirements in Section 01 33 00 – Submittal Procedures.
- B. At a minimum, the following shall be submitted for Owner review and approval:
 - 1. Drawings showing shelving materials of construction, finishes, and dimensions.
 - 2. Manufacturer's standard color selection chart.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Color shall be selected from manufacturer's standard colors (minimum of 4 colors must be submitted).
- B. Each unit shall be provided as a complete unit with closed uprights and back unless noted otherwise.
- C. To establish quality and quantity, Lyon Metal Products product numbers may be shown. Products of similar basic design and same quality will be acceptable as equals.

2.2 METAL SHELVING AND STORAGE BINS

- A. Materials: Sheet metal shall be cold-rolled sheet metal of gages specified. Rolled steel tees and shapes shall be provided where necessary.
- B. Uprights: Open uprights shall consist of two 1-1/2-inch by 1-1/2-inch by 1/8-inch rolled tees and one cross brace of two 1-inch by 12-gage bands. Closed uprights shall consist of two 1-1/2-inch by one 1/2-inch by 1/8-inch rolled tees and a 24-gage full height side sheet securely welded to front and rear tees. All uprights shall be punched for self-adjustment at not more than 2-inch on center.

- C. Shelving: Shelving shall be heavy duty reinforced shelving of 18-gage sheet with front, rear and end flanged down and up to form safe edges. Shelves shall be reinforced at front and rear flange with minimum 1-inch by 12-gage band. All corners shall be lapped and spot welded. Shelving shall be punched at 3-inch centers for divider adjustment. Shelving shall be provided with and assembled to uprights with quick adjustment clips and fasteners. Each shelf shall be provided with continuous label holder.
- D. Backs: Backs shall consist of 24-gage steel with not less than three rows of vertical holes at same spacing as upright for shelf supports.
- E. Dividers: Crosswise dividers shall extend from front to back and from top to bottom. The front and rear edges shall be curled while top and bottom edges are bent and punched for attaching to shelves.
- F. Base: Base shall be 3 or 4 inches high and constructed of not less than 20-gage steel. Base shall be channel formed with ends constructed to engage uprights and to lock in place with necessary fasteners.
- G. Finish: All parts shall be thoroughly cleaned and provided with baked-on heavy finish coat of enamel. All units shall be complete with fasteners and ends. Ends shall be provided even if reference number does not indicate end.

PART 3 - EXECUTION

3.1 METAL SHELVING AND STORAGE BINS

- A. The shelving units shall be installed in groups as shown. They shall be fastened to the wall, to sides of each other and to the rear where back to back. The Contractor shall secure the units to the floor with galvanized steel angles and stainless steel expansion bolts. Units shall be provided with all necessary seismic bracing required by the local Building Code.

END OF SECTION 10 56 13

SECTION 13 34 19 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall provide all labor and material to design and construct the metal building as shown on the drawings. The building shall include all primary and secondary structural framing members, connection bolts, roof and wall panel systems, insulation, flashing, gutters and downspouts, fasteners, closures, sealant, and other miscellaneous items shown or required for a complete installation and weathertight/watertight structure.
- B. The Contractor shall furnish and install all components, materials and sub-assemblies, and all appurtenant work to construct the pre-engineered metal building system, complete, and in accordance with the requirements of the Contract Documents.
- C. The Contractor shall engage the Metal Building Manufacturer to perform the following services at no additional cost to the Owner.
 - 1. The Metal Building Manufacturer shall provide an engineered design of the complete structure to verify that the metal building system and all connections and components are sized correctly for vertical and lateral loads, in compliance with "Design Criteria" specified herein and as shown on the drawings. The design shall be prepared by a Registered Professional Engineer licensed to practice in the State of Oregon and submitted to the Engineer for Review. The submittal shall show all layouts of the building including anchor bolt layouts. Calculations shall be submitted showing all loads to the building foundation. Building foundation design to be completed by Engineer based on loads provided by Metal Building Manufacturer.

1.2 REFERENCE STANDARDS

- A. The design shall comply with the 2026 Oregon Structural Specialty Code (OSSC) and combinations of loads shall be in compliance with OSSC Section 1605.
- B. Commercial Standards:
 - 1. AISC American Institute of Steel Construction, "Steel Construction Manual" and "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings"
 - 2. AISI S100 American Iron and Steel Institute, "North American Specification for the Design of Cold-Formed Steel Structural Members"
 - 3. AISI Design of Light Gage Steel Diaphragms.
 - 4. ASTM A36 Standard "Specification for Carbon Structural Steel"

5.	ASTM A307	Standard “Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength”
6.	ASTM A153	Standard “Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware”
7.	ASTM A463	Standard “Specification for Steel Sheet, Aluminum-Coated, by Hot-Dip Process”
8.	ASTM A475	Standard “Specification for Zinc-Coated Steel Wire Strand”
9.	ASTM A500	Standard “Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes”
10.	ASTM A501	Standard “Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing”
11.	ASTM A529	Standard “Specification for High-Strength Carbon-Manganese Steel of Structural Quality”
12.	ASTM A536	Specification for Ductile Iron Castings
13.	ASTM A572	Standard “Specification for High-Strength Low-Alloy Columbium-Vanadium Steel”
14.	ASTM A653	Standard “Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process”
15.	ASTM A792	Standard “Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process”
16.	ASTM A1011	Standard “Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Allow with Improved Formability”
17.	ASTM C665	Standard “Specification for Mineral-Fiber Blanket Thermal Insulation for Light Framed Construction and Manufactured Housing”
18.	ASTM D635	Standard “Test Method for Rate of Burning and/or Extent of Time of Burning of Plastics in a Horizontal Position”
19.	ASTM D1494	Standard “Test Method for Diffused Light Transmission Factor of Reinforced Plastic Panels”
20.	ASTM D1929	Standard “Test Method for Determining Ignition Temperature of Plastics”

21.	ASTM E84	Standard "Test Method for Surface Burning Characteristics of Building Materials"
22.	ASTM E1514	Standard "Specification for Structural Standing Seam Steel Roof Panel Systems"
23.	ASTM E1592	Standard "Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference"
24.	ASTM E1646	Standard "Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference"
25.	ASTM E1680	Standard "Test Method of Rate of Air Leakage through Exterior Metal Roof Panel Systems"
26.	ASTM F3125	Standard "Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength"
27.	AWS D1.1	American Welding Society, "Structural Welding Code-Steel"
28.	AWS D1.3	American Welding Society, "Structural Welding Code-Sheet Steel"
29.	AWS	American Welding Society, "Standard Code for Arc and Gas Welding in Building Construction"
30.	MBMA	Metal Building Manufacturers Association, "Design Practices Manual"
31.	MBMA	Metal Building Manufacturers, "Low-Rise Building Systems Manual"
32.	NAIMA	North American Insulation Manufacturers Association, "Standard for Flexible Fiberglass Insulation Systems in Metal Buildings"
33.	RCSC	Research Council on Structural Connections, "Specification for Structural Joints Using High-Strength Bolts"
34.	SDI	Steel Deck Institute, "Steel Roof Deck Design Manual"
35.	SJI	Steel Joist Institute, "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders"
36.	UL 580	Underwriters Laboratories Inc, "Tests for Wind Uplift Resistance of Roof Assemblies"

- C. Manufacturer's Standards: In addition to the standards listed above, the pre-engineered metal building system, its related accessories, and erection shall be in accordance with the manufacturer's published recommendations and specifications.

1.3 DESCRIPTIONS

- A. Building Type: Clear span gabled rigid frame with variable depth column and rafter sections of shop welded steel plates.
- B. Building Height and Roof Slope: As shown on Contract Drawings.
- C. Column Spacing at Exterior Walls: As shown on Contract Drawings and compatible with placement of openings and other requirements.
 - 1. A minimum of 1-inch non-shrink, non-metallic grout shall be provided under the column base plate, unless otherwise noted.

1.4 DESIGN CRITERIA

- A. Design shall conform to the 2025 Oregon Structural Specialty Code and 2025 Oregon Energy Efficiency Specialty Code; hereafter called the Code.
- B. The building shall be designed by the Manufacturer as a complete system. All components of the system shall be supplied or specified by the same manufacturer. The following systems shall be part of the metal building manufacturers' portion of the project.
 - 1. The metal building manufacturer shall design and supply vertical and lateral load components as well as the weather and thermal protection system, including liner panels, for the main building shell including all blocking at penetrations and additional support framing at equipment locations.
 - 2. The metal building manufacturer shall be responsible for the design of the vertical and lateral load components for the Mezzanine including the composite steel floor deck, steel floor beams and joists and any additional interior columns indicated on the plans for the support of the Mezzanine, steel edge plates used for concrete stops at the perimeter of the slab and any floor openings.
- C. Building Loads: The Metal Building Manufacturer shall design the building for following building loads indicated on the plans.
 - 1. Collateral Dead Loads: Collateral dead loads which are in addition to the metal building dead loads shall be applied to the structure to account for the weight of additional permanent materials other than the building system, such as sprinklers, mechanical systems, electrical systems, and ceilings and concrete topping load on the Mezzanine. This allowance does not include the weight of hung equipment weighing 50 pounds or more. Equipment loads of 50 pounds or more shall be investigated and the structure (frame, purlins, girts) shall be strengthened as required. The Contractor is responsible for providing the Building Manufacturer the magnitude and approximate location of all concentrated loads greater than 50 pounds. Contractor to provide approved submittal of ceiling fans to Building Manufacturer prior to design of building.

2. Roof Live Loads
3. Roof Snow Loads.
4. Floor Live Loads,
5. Equipment Loads.
6. Wind Loads: Wind load on main framing shall be computed and applied in accordance with the Code and information contained in the General Structural Notes of the Contract Drawings. Wind pressures on parts and components shall be computed and applied in accordance with the Code or ASCE 7. Wind Loads: Wind load on main framing shall be computed and applied in accordance with the Code and information contained in the General Structural Notes of the Contract Drawings. Wind pressures on parts and components shall be computed and applied in accordance with the Code or ASCE 7.
7. Seismic Loads: Seismic loads shall be computed in accordance with the Code and information contained in the General Structural Notes of the Contract Drawings
8. Concentrated Loads: Concentrated loads shall be applied at locations indicated on the Drawings.

D. The metal building manufacturer also include the following in their design.

1. Importance Factors: Importance Factors shall be in accordance with the Code and information contained in the General Structural Notes of the Contract Drawings.
2. Load Combination: The load combinations contained in the Code shall be used in the design, whichever produces the most unfavorable effects on the building or structural member concerned.
3. Dead load shall be weight of all permanent construction materials including collateral loads. Dead load for combination (Dead + Wind Uplift) shall not include collateral loads. For buildings with cranes, additional load combinations specified in MBMA Manual shall be included. All load combinations including snow shall consider both balanced and unbalanced conditions if required by code for the roof slope indicated.
4. Drift/Deflection Provisions: Horizontal deflections of sheeting, secondary, and primary structural elements shall not exceed the following:
5. Lateral Sidesway - frames, $H/120$;
6. Longitudinal Sidesway - bracing, $H/120$;
7. Wall Panels, $L/90$; Girts, $L/120$;
8. End wall Columns, $H/120$;

9. The allowable live load deflection of roof elements shall not exceed $L/180$ (where L is length of span). The allowable live load deflection of all Mezzanine framing members shall not exceed a live load deflection of $L/360$ and a total load deflection of $L/240$. Deflections of the steel framing above and along the sides of the framed door openings shall be limited to $L/360$.
- E. Thermal Effects: Standing Seam roof panels and wall panels shall be free to move in response to the expansion and contraction forces resulting from a temperature variation.
- F. Framing and Structural Members:
 1. Structural Framing: Design primary and secondary structural members and exterior covering materials for applicable loads and combinations of loads in accordance with the Metal Building Manufacturer's Association (MBMA) "Design Practices Manual."
 - a. Design each member to withstand stresses resulting from combinations of loads that produce the maximum allowable stresses in that member as prescribed in MBMA "Design Practices Manual."
 - b. Framed openings shall be designed to structurally replace the covering and framing displaced.
 - c. Pinned connection shall be assumed at all column bases.
 - d. Consider in the building frame design the loads imposed by doors, including catenary forces.
 2. Structural Steel: For the design of structural steel members, comply with the requirements of the American Institute of Steel Construction (AISC) "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.
 3. Light Gauge Steel: For the design of light gauge steel members, comply with the requirements of the American Iron and Steel Institutes (AISI) "Specification for the Design of Cold Formed Steel Structural Members" and "Design of Light Gauge Steel Diaphragms" for design requirements and allowable stresses.
 - a. For welded connections, comply with the American Welding Society (AWS) "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.
 4. Foundation Requirements: The size of the building column base plates shall not exceed the pier and wall. Preliminary foundation sizes are indicated on the Drawings and shall be configured to provide minimum anchor bolt edge distances indicated. All anchor bolts shall be designed and detailed including embedment length by the Building Manufacturer. If anchorage embedment requires modifications to the foundations shown in the Drawings, modifications shall be made by the Contractor and approved by the Engineer at no cost to the Owner.

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.
- B. Submit shop drawings and structural calculations for complete system including foundation anchor bolt layout. Drawings shall be stamped by a licensed structural Engineer in the State of Oregon.
- C. Shop drawings shall show each type of structural building frame required and its location within the structure; details of anchor bolt settings; sidewall, endwall, and roof framing; bracing and location within the structure; wall and roof insulation and types; longitudinal and transverse cross sections; details of curbs, roof jacks, and items penetrating the roof; trim, wall and roof coverings; door, window and louver trim details; and all accessory items; materials; finishes; construction and installation details; and other pertinent information required for proper and complete fabrication, assembly and erection of a watertight metal building system.
- D. Calculations and details of anchorage, including embedment length and layout shall be by the Building Manufacturer and shall be submitted for review.
- E. Building Manufacturer shall furnish erection drawings identifying all materials in sufficient detail to indicate the proper assembly and installation of the metal building components. Drawings shall show all sealant locations.
- F. Material and Color Samples: Upon request, color and texture samples shall be submitted to the Owner for review. The samples shall be clearly marked to show the manufacturer's name and product information.
 - 1. 12-inch square of roofing and siding panels, with required finishes.
 - 2. Fasteners for application of roofing and siding panels.
 - 3. Sealants and closures.
 - 4. Color and texture samples sets shall be representative of the full range of alternatives available for selection by the Owner. Not less than 10 colors shall be submitted for color selection by the Owner. 2 12-inch samples of the selected trim color, roof color, and siding color shall be submitted after color selection.
 - 5. Roof and wall insulation shall be submitted and conform to the requirements of specification section 07 21 12 Thermal Protection for Metal Buildings.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications. The steel building manufacturer shall be a member of the "Metal Building Manufacturers Association" or other national recognized certifying agency and shall conform with their "Code of Standard Practices" the building manufacturer shall have been designing and fabricating metal buildings continuously for the last 5 years.

- B. Erector's Qualifications: The erector of the prefabricated metal building shall be licensed by the metal building manufacturer and shall have not less than 5 years successful experience in the erection of prefabricated buildings similar to that required for this project. Handle and store all materials to avoid damage and replace any damaged materials. Do not field cut or alter structural members without approval from manufacturer.
 - 1. Erector shall observe and follow recommendations of the Metal Building Manufacturers Association (MBMA) practice and procedures where applicable.
- C. Pre-Installation Conference. Prior to erection of steel and placement of wall and roof panels, the Contractor, metal building manufacturer, and any sub-contractor responsible for metal building erection shall attend a pre-installation conference at the project site. This meeting will be held approximately one week prior to erection of primary framing and the following will be agenda items:
 - 1. Protective Coatings
 - 2. Tolerances
 - 3. Quality Control
 - 4. Roof & Wall Panel Installation
 - 5. Flashing & Trim
 - 6. Closures, Mastics and Sealants
 - 7. Window and Door Framing and Trim
 - 8. Final Inspection & Manufacturer Certification
- D. General Warranty: The Contractor shall furnish the manufacturer's standard 3-year workmanship warranty, commencing on the date of acceptance of the Project.
- E. Warranty for Roof Panels: Manufacturer's standard 20-year paint finish warranty and manufacturer's standard twenty year no-perforation warranty.
- F. Warranty for Wall Panels: Manufacturer's standard 20-year paint finish warranty.

1.7 ADMINISTRATION

- A. All nomenclature shall conform to the MBMA Metal Building Systems Manual.
- B. Coordination and administration of the work shall be in accordance with the MBMA Metal Building Systems Manual – Chapter IV Common Industry Practices.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural steel plate, bar, sheet and/or strip used in bolted and/or welded constructions shall be material based on the requirements of ASTM A572, A529, A992 or A36 Modified 50, and have a minimum yield strength of 50,000 psi.
- B. Structural steel material used in roll formed or press broken secondary structural members shall be material based on the requirements of ASTM A570, and have a minimum yield strength of 55,000 psi.
- C. W, M and S shapes, angles, rods, channels and other hot-rolled shapes shall be of material based on the requirements of ASTM A572, A992 and/or ASTM A36 as applicable; and shall have minimum yield strengths as required per design.
- D. Galvanized steel shall conform to ASTM A653, G 90 coating designation, 0.045-inch minimum thickness.
- E. Structural bolts and nuts used with primary framing shall be high strength bolts meeting the requirements the requirements of ASTM F3125. Bolts and nuts used with secondary framing members shall conform to the requirements of ASTM A307.

2.2 PRIMARY FRAMING

- A. Primary framing members shall be the main load-carrying structural steel members consisting of solid web framing using tapered or uniform depth rafters rigidly connected to tapered or uniform depth columns. The frames shall be designed with pinned base condition and provide for all field connections to be bolted. Endwall framing members may be the primary load carrying members at the endwalls of the building. These members consist of floor beams, rake beams, interior columns, endposts, cornerposts and/or full or partially loaded frames and are welded built-up sections, cold-formed light gage shapes and/or hot-rolled shapes.

2.3 SECONDARY FRAMING

- A. Secondary framing members shall be structural members which carry loads to the primary framing members. They consist of eave members, roof purlins, transbay members, wind struts, wind bracing, wall girts and other miscellaneous structural framing and are either welded built-up sections, cold-formed light gage shapes, and/or hot-rolled shapes.
- B. Purlins, girts and eave struts shall be "Zee" or "Cee" shaped; not less than 16-gauge and have a minimum yield strength of 55,000 psi meeting the requirements of ASTM A570. Purlins shall be designed as simple span or continuous span for loads as specified. Provide base girts for attaching wall panels.
- C. Primary Frame flange bracing shall be steel angles attached from purlins and/or girts to the primary framing. The quantity and locations of flange bracing shall be shown on the shop drawings.
- D. Purlin Bracing shall be channels fabricated from 16-gauge minimum thickness.

- E. Base or Sill Angles shall be fabricated from 14-gage minimum thickness cold-formed galvanized steel.
- F. Door headers and jambs shall be "Zee" or "Cee" shaped and shall be fabricated from 14-gauge minimum thickness cold-formed galvanized steel having a minimum yield strength of 55,000 psi.
- G. Sag angles and bridging shall be angles and have a minimum yield strength of 36,000 psi.
- H. Wind and Seismic bracing shall be accomplished by portal, torsional, diagonal bracing and/or diaphragm in accordance with the manufacturer's standard design practices. The quantity and location of bracing is to be shown on the shop drawings and location approved by the Engineer. Wind bracing members include rods, or angles conforming to the requirements of ASTM A36.

2.4 PAINTING AND COATING OF STRUCTURAL MEMBERS

- A. All structural steel members shall be painted prior to placement of wall and roof panels. At the Contractor's option, this Work may be performed prior to or after erection of primary and secondary framing. Necessary precautions shall be undertaken to control overspray and weather conditions monitored to ensure coating is applied per manufacturer's recommendations.
- B. All structural steel members shall be cleaned of oil, dirt, loose scale and foreign matter prior to receiving one shop coat using the building manufacturer's standard primer paint. Provide factory applied prime coat compatible with final coating system and in accordance with the surface preparation per Society for Protective Coatings (SSPC) and recommendations per coating manufacturer.
- C. The Contractor shall be responsible for field touch-up painting that may be required and is responsible for any results due to deterioration of the shop coat of primer paint.
- D. The manufacturer shall apply a shop prime all steel prior to shipment to the project site. Apply a rust inhibitive primer paint which meets or exceeds performance requirements of Federal Specification TTP 664c. Primer shall have a gloss equal to 10-15 units, 60-degree gloss meter (Gardner).

2.5 ROOF & WALL PANELS

- A. Metal roof and wall panels shall withstand the effects the specified loads and stresses within limits and under conditions indicated, based on testing according to ASTM E330.
- B. The roof panel attachment system to the building purlins shall be tested and certified to meet Underwriters Laboratory UL 90 wind uplift rating.
- C. Panels shall be constructed of galvanized steel coil used in roll formed wall panels shall conform to the requirements of ASTM A446, and have a minimum yield strength of 50,000 psi. Galvanizing shall be .0015-inch thick zinc alloy coating on both sides.
 - 1. Unless otherwise specified or indicated on the drawings, wall panel systems shall be 26-gauge minimum and shall provide 42 inch wide net coverage.

2. Unless otherwise specified or indicated on the drawings, the roof panel system shall be 24 gauge minimum, provided a 42-inch wide net coverage having 2-inch high major ribs formed at the panel side laps.

- D. Provide metal roof and wall panels and system components with the following fire-test-response characteristics as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

Parameter	Requirement
Fire-Resistance Characteristics	Per ASTM E119
Intermediate-Scale Multistory Fire Test	Per NFPA 285
Radiant Heat Exposure	No ignition per NFPA 268
Potential Heat	Acceptable level per NFPA 259
Surface-Burning Characteristics	Flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E84

- E. Roof Panels and Roofing Assembly shall be required to be Class A as set forth by the 2025 edition of the Oregon Structural Specialty Code.
- F. Wall panels side laps shall be at least one full major rib. The wall overlapping rib shall utilize a capillary groove. Wall panel endlaps shall occur at a support member only.
- G. All roof panels shall be continuous from low eave to high eave except where the panel length exceeds 41 feet or otherwise becomes prohibitive for handling purposes, in which case, endlaps may be used. Roof panel endlaps shall be 7 inch and occur over the supporting member.
- H. Panel texture, color, rib spacing, and rib height shall be selected by Owner.
- I. Insulation: In accordance with Section 07 20 12 – Thermal Protection for Metal Buildings.
- J. Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

4. Panel Fasteners: Self-tapping screws; bolts and nuts; self-locking rivets and bolts; end-welded studs; and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.
- K. The exterior and interior surfaces of the roof and wall panels shall be coated as specified under "Panel Finishes" below.
- L. Manufacturers, Or Equal:
 1. CENTRIA Architectural Systems
 2. Coldmatic Building Systems
 3. Galvamet Inc.
 4. Insulated Panel Systems, Div. of NCI Building Systems
 5. Metecno-Aluma Shield, Metecno Panel Systems, Inc.
 6. Metl-Span

2.6 ROOF & WALL PANEL FINISHES

- A. Roof and Wall panel exterior finishes shall consist of a factory applied minimum dry thickness of 1.0 mil Kynar 500 coating applied to the exterior surface of G90 galvanized steel. Color of the exterior finish shall be selected by the Engineer from the building manufacturer's standard colors.
- B. The interior surface shall be coated with factory baked on Hylar 5000 PVDF fluoropolymer resin based Fluorothane IV coating applied in multiple coats to dry minimum thickness of 2.75 mils or equal. Color of the interior finish shall be selected by the Owner from the building manufacturer's standard colors.
- C. Roof panel finish shall consist of one of the following:
 1. Exterior finishes shall consist of a factory applied minimum dry thickness of 1.0 mil Kynar 500 coating applied to the exterior surface of G90 galvanized steel. Color of the exterior finish shall be selected by the Engineer from the building manufacturer's standard colors.
 2. Aluminized finish as required by manufacturer's design and match existing.

2.7 INTERIOR WALL & CEILING LINER PANELS

- A. Form liner panels from 0.0239-in minimum total coated thickness and steel with minimum yield strength of 80,000 psi.
- B. Painted Panel Finish:

1. Exposed Side: 0.15-mil min primer and 0.70-mil minimum interior white polyester paint.

2. Unexposed Side: 0.1-mil minimum primer and 0.40 minimum polyester backer

Panel Dimensions: Nominal 36 inches wide with corrugations ½ inches high, 3 inches on center.

D. Factory cut panels to lengths required.

2.8 FLASHING AND TRIM

A. Provide flashing and trim formed from 0.018-inch minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coating.

B. Flashing and/or trim shall be supplied at rakes, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and/or a finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers.

C. Standard trim configurations and/or finishes for given conditions shall be determined by the specific roof and wall panel system and finish combinations.

D. Trim finishes to match adjacent panel finish.

2.9 CLOSURES, MASTICS AND SEALANTS

A. Closures formed to match roof and wall panel profiles shall be used to provide weathertightness. Closures shall be of a closed cell material, EPDM (Ethylene-Propylene-Duene-Monomer) in a gray or neutral color.

B. Pre-formed tape mastics, and/or non-skinning tube sealants shall be used for the sidelaps and endlaps of all roof coverings.

C. Tape Mastic shall be pre-formed butyl rubber-based compound. The compound shall be non-hardening, non-corrosive to metal and have excellent adhesion properties. Tape mastic shall be white or light gray in color. Tube Sealant shall be a synthetic elastomer based material in gray or bronze.

2.10 FRAMED OPENINGS

A. Framed wall openings at doors, windows, louvers, vents and fans shall be cold-formed gage material adequate to support the loads. Openings shall be flashed with trim so that no primed steel is exposed to the exterior. Color of the trim shall match the trim color used on the building.

2.11 WINDOWS

A. Windows and frames are specified in Section 08 51 13 – Aluminum Windows. The metal building erector shall provide all necessary accessories including framing, flashing, trim,

closures and sealants to install the windows in a watertight assembly. The metal building erector shall install the windows and frames in the building including all accessories.

2.12 HOLLOW METAL DOORS AND FRAMES

- A. Hollow metal doors and frames are specified in Section 08 11 13 – Hollow Metal Doors and Frames. The metal building erector shall provide all necessary accessories including framing, flashing, trim, closures and sealants to install the doors in a watertight assembly. The metal building erector shall install the hollow metal doors and frames in the building including all accessories. Hollow metal doors shall be painted to match the color of the metal building.

2.13 COILING DOORS

- A. Coiling doors and frames are specified in Section 08 33 23 – Overhead Coil Doors. The metal building erector shall provide all necessary accessories including framing, flashing, trim, closures and sealants to install the doors in a watertight assembly. The metal building erector shall install the coiling doors and operators in the building including all accessories. Coiling doors shall be painted to match the color of the metal building.

2.14 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering pre-engineered metal building systems which may be incorporated in the Work, include, but are not limited to, the following:
 - 1. Nucor

PART 3 - EXECUTION

3.1 FABRICATION

- A. Structural members shall be fabricated by methods of shearing, forming, punching, welding, flame cutting, drilling, reaming, etc. in accordance with standard practices.
- B. Structural members of welded plate sections shall have the flanges and webs joined by a continuous automatic submerged arc welding process. Shop welding shall be performed by certified welders.
- C. Shop connections shall be welded. Field connections shall be bolted using A325 or A307 bolts in punched, drilled, or reamed holes, in accordance with standard practices.
- D. Fabricated parts shall be identified, either individually or by lot or group, using an identification marking corresponding to the marking shown on the erection drawings. Markings are normally stamped, stenciled, tagged or lettered so as to remain visible after shop painting.

3.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials: Manufactured materials and prefabricated components shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.
- B. Storage: All materials shall be carefully stored in conformance with the manufacturer's recommendations, on platforms or pallets above grade or on concrete slab, covered with opaque tarpaulins or other approved weather-resistant ventilated covering. Storage shall be in a manner that will prevent damage or marring of finish.

3.3 ERECTION

- A. Metal building system components shall be installed in strict compliance with manufacturer's instructions shown on final shop drawings.
- B. Erect building system in accordance with manufacturer's instruction, erection drawings, OSHA regulations and all other applicable erection documents.
- C. Erector's Qualifications: The erector of the prefabricated metal building shall be licensed by the metal building manufacturer and shall have not less than 5 years successful experience in the erection of prefabricated buildings similar to that required for this project. Handle and store all materials to avoid damage and replace any damaged materials. Do not field cut or alter structural members without approval from manufacturer.
 - 1. Erector shall observe and follow recommendations of the Metal Building Manufacturers Association (MBMA) practice and procedures where applicable.
- D. Structural Frames: Structural frames shall be erected true to line, level and plumb, braced and secured with temporary bracing in all directions as required. Install panel sidelap away from prevailing wind or view direction when possible, maintaining proper lap without fastener dimpling or excessive overlap.
 - 1. Accessories: Install flashings, trim, ridge covers, roof curbs, skylights, pipe flashings, closure strips, roof jacks, gutters, roof drains and other accessories and sheet metal items in accordance with manufacturer's recommendations for positive attachment to building and provide a weathertight mounting.

3.4 METAL WALL PANEL INSTALLATION

- A. Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.
- B. Install clips to supports with self-tapping fasteners.
- C. Accessory Installation. Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.5 PROTECTIVE COATINGS

- A. All abrasions, scratches, field welds or other damages in shop-primed or factory-finished painted surfaces shall be touched-up consistent with the quality and coating thickness of original shop primer or factory-finished painting.
- B. Finish paint coats shall be applied to factory-primed items.
- C. Finish coats shall be provided which are compatible with the metal building manufacturer's prime coat paints.
- D. Approved type barrier coats shall be provided over incompatible primers where required.
- E. Hardware, accessories and similar items not intended to be finish-painted shall be properly protected during painting operations.

3.6 FIELD QUALITY CONTROL

- A. All framing members shall be erected plumb, level or aligned not to exceed a deviation of 1:300.
- B. The prefabricated metal building manufacturer's field representative shall make an on-site inspection during the erection and installation of the building as required to ensure that erection is in accordance with the manufacturer's standards, at no attritional cost to the Owner.
- C. The metal building manufacturer shall provide written certification that the final installation has been erected in conformance with the manufacturer's recommendation and meets the requirements of the Specifications.

END OF SECTION 13 34 19



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