Guideline Specifications

12.16.2014

FARMINGTON HEALTH CARE CENTER

University of Utah Healthcare

U of U Project Number 21682

Supplemental Information:

Purpose of Outline Specifications

The purpose of the following Specification is to provide a baseline for the minimum standards of materials and design that will be expected on the project.

Although, every attempt has been made to incorporate the University of Utah's and DFCM's building standards into this document, the Design Teams are responsible to confirm and to verify that the final building design meets the requirements set forth in the referenced standards. If there are conflicts that are found within the standards. The Design Team is to discuss with the DFCM and University of Utah's project managers and determine which standard is most beneficial to the project and should be used.

Energy Requirements

This project will be LEED Silver Certified per the University requirements.

University of Utah Requirements

Minimum Design Standards,
The project must meet all DFCM and University of Utah Design Standards.

C. Credits in the LEED System
The project must specifically achieve the following credits in the LEED rating system unless otherwise accepted by the Director for DFCM managed projects, or the Associate V.P. for Facilities for University managed projects.

University of Utah Energy Standard: In addition to meeting DFCM Requirements for High-Performance Buildings, all University of Utah projects exceeding $2.5 million must meet the following additional minimum standards (unless a lower requirement is approved by Associate V.P. for Facilities):

(a) LEED EA Credit 1 Optimize Energy Performance:
1) For all Hospitals and Clinics: 5 points minimum
2) For all other Building Types: 15 points minimum (not including regional bonus credit point – if achieved)

(b) LEED EA Credit 5: Measurement and Verification: 3 Points

(c) Compliance with the University's *Measurement and Verification Plan.*
The Plan is available on the University's Facilities Management web site: http://facilities.utah.edu/project-resources/documents-standards/MV-4-30-14.pdf

(d) For each type of building for which EPA offers a rating, design the project to meet EPA criteria for ENERGY STAR. To insure projects are eligible to receive certification complete all applications for

"Designed to Earn the ENERGY STAR" and achieve an ENERGY STAR score of 75 or higher using Portfolio Manager and verified by a professional engineer.

End of 5.0 High Performance Building Rating System

DFCM has a State High Performance Standard which needs to be met. The most current version of this Standard is as followed.

HIGH PERFORMANCE BUILDING RATING SYSTEM (2009)

General

A. This section defines a High Performance Building Rating System for Buildings.
B. As required by contract, the building shall comply with the High Performance Requirements in this section.

Definitions

"Agency" is any state agency, board, commission, department, or division.

"Designer" is the architect(s), engineer(s), and other professionals responsible for the building design.

"Institution" means the University of Utah

.

"Life-cycle costs" means the sum of the present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs, and disposal costs, over the lifetime of the project, product, or measure.

"Life-cycle cost-effective" means the life-cycle costs of a product, project, or measure are estimated to be equal to or less than the base case (i.e., current or standard practice or product).

Referenced Standards and Codes.

The design shall comply with all applicable Standards and Codes at the time submitted to the State Building Official, including but not limited to:
ANSI/ASHRAE Standard 52.2, *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*
ANSI/ASHRAE Standard 55, *Thermal Environmental Conditions for Human Occupancy*
ANSI/ASHRAE Standard 62, *Ventilation for Acceptable Indoor Air Quality.*
ANSI/ASHRAE/IESNA Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*, including Appendix G.
Illuminating Engineering Society of North America, *IESNA Lighting Handbook*.
U.S. Green Building Council, *Leadership in Energy & Environmental Design for New & Major Renovations* (LEED-NC).
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Requirements

- The project must meet all DFCM Design Standards.
- The project must achieve a LEED Silver certification.
- The project must specifically achieve the following credits in the LEED rating system unless otherwise accepted by the Director:
    - WE Credit 1.1: Water Efficient Landscaping: Reduce by 50%
    - EA Credit 3 Enhanced Commissioning
    - EQ Credit 3.1 Construction IAQ Management Plan: During Construction
    - EQ Credit 4.1: Low-Emitting Materials: Adhesives and Sealants
    - EQ Credit 4.2: Low-Emitting Materials: Paints and Coatings

    - The project team must hold a sustainability charrette that is at minimum
    - approximately 3 hours of dedicated time. The charrette shall be completed during
    - the Schematic Document Phase if the project is a CMGC or Design/Bid/Build delivery. The charrette shall be completed during the programming phase and incorporated into the program documents if there is any chance that it shall be a Design-Build delivery. The charrette must attended by the following team members at minimum:
    - DFCM Project Manger
    - DFCM Energy Program Director
    - Architect team
    - Mechanical and Electrical Engineering team
    - Energy Consultant team
    - User Group Member or Building Occupants
    - General Contractor (if hired)
    - Commissioning Agent (if hired)
    - Facility Management Personnel Design Requirements – 061109 77

- The Charrette shall cover the following topics at minimum:
    - Targets and strategies for reducing energy consumption via building orientation and envelope, and via occupant behavior, and building systems
    - Site analysis as it relates to ecological impact to surrounding areas
    - Target for an overall building EUI (Energy Use Index)
    - Strategies for reducing water consumption
    - Spaces and activities most benefited from daylighting and daylighting controls
    - Methods for reducing single occupant car commuting to the building
    - Methods for building processes to reduce consumption and waste of resources during and after construction.

- The project must model the building systems to analyze and make selections based on life-cycle cost. High Performance Buildings are to be built to a 50 year lifecycle. Analysis should include the following costs:
    - Initial Costs—Purchase, Acquisition,
    - Construction Costs
    - Fuel Costs and Energy costs
    - Operation, Maintenance, and Repair Costs
    - Replacement Costs
    - Residual Values—Resale or Salvage Values or Disposal Cost
    - Finance Charges—Loan Interest Payments if applicable

- Non-Monetary Benefits or Cost

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Life Cycle cost can be calculated by using the Building Life-Cycle Cost Program that is available for download from the Federal Energy Management Program (http://www1.eere.energy.gov/femp/information/download_blcc.html) or by following equation: LCC = I + Repl — Res + E + W + OM&R + O

Where:

LCC = Total LCC in present-value (PV) dollars of a given alternative
I = PV investment costs (if incurred at base date, they need not be discounted)
Repl = PV capital replacement costs
Res = PV residual value (resale value, salvage value) less disposal costs
E = PV of energy costs
W = PV of water costs
OM&R = PV of non-fuel operating, maintenance and repair costs
O = PV of other costs (e.g., contract costs for ESPCs or UESCs)

An energy model shall be completed to demonstrate the building design performance relative to a code compliant building. Methods for modeling shall follow those outlined by the LEED reference guide. Unless otherwise approved by the Director, the energy model must include an analysis of evaporative cooling technology and the model must include an analysis of daylighting control technology. It must also give the modeled EUI in Kbtu/sf.

- The facility must be equipped with meters or submeters to measure the individual facility's energy consumption on an ongoing basis in a format that allows the consumption data to be entered into the Energy Star Portfolio Manager Program.

Submittals

- Design team shall submit the Charrette Summary, Life Cycle Cost Analysis, LEED submittals and Submittal Comments, Commissioning Report, and the Energy Analysis to document compliance with these High Performance Building Requirements.

Mock-up

This project will require construction of a full-scale mock-up of exterior assembly at corners and roof conditions to permit evaluation and performance of building skin materials, glazing and storefront, through-wall and exposed flashings, trim, air barriers and transitions between differing building materials to achieve weather tight performance of the total assembly.. Preliminary testing of the building envelope as exterior enclosure materials are added will be required in the course of erecting the mock-up at the Owners direction.

Interior Design Services

The Design Team will be responsible for the completion of the interior design of the facility including but not limited to the selection, specification and coordination of furniture. The selection of the furniture will need to be coordinated with the User, The University and DFCM. The final selected furniture will need to

be specified in such a manner that the University Procurement Department can send the information out to bid.

Medical Equipment for the project will be specified and supplied by The University. The Design Team will coordinate with all specified equipment and provide all necessary access paths, backing, structural support, mechanical/electrical connections and service areas. The equipment layout and positioning will be the responsibility of the Design Team (within the contract documents). Some specialty equipment may require additional permit requirements that are the responsibility of the Owner. The Design Team will support and coordinate with the Owner or Owner's Representative with this work.

Material

DFCM and The University of Utah typical build institution project with life expectancies of 50 to 75 year buildings. Realizing the budget constraints of this project the Design Team will need to be creative. All final materials will need to be approved by DFCM and The University. Within the sections of the attached specification materials have been specified. These materials have been used as example and a minimum quality that will be expected. These are in no way the only material that can meet the quality level expected by the University or DFCM. As stated above, even if specified within the specification, all materials will need DFCM and The University approval.

FARMINGTON HEALTH CARE CENTER
UNIVERSITY OF UTAH HEALTHCARE
U OF U PROJECT NUMBER 21682

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SECTION 011000 - SUMMARY

1.1 PROJECT INFORMATION

A. Project Identification: Farmington Health Care Center

1. Project Location: Farmington, Utah.

B. Owner: Utah DFCM.

1. Owner's Representative:

C. The Project will be constructed under a Design Build Agreement to DFCM

D. The Work of Project: Build a Medical Clinic structure in compliance with DFCM and University standards and as specified herein ,

Size, code classification for occupancy and construction type, and general description of major building assemblies are outlined in the provided Programming document.

E. Type of Contract: DFCM's Design Build, **Single prime** contract

F. The Project will comply with the High Performance Building Standards established by DFCM
1. The Owner shall directly hire the Energy Engineer, Building Envelope Commissioning Agent and Commissioning Agent in the design phase. The Energy Engineer shall provide Energy Engineering over the course of the entire Project as part of the Design Team.
2. During Schematic, Design Development and Construction Documents phases, meetings shall be conducted to establish and review building systems applicable to the Project.
3. Testing of building envelope components on a mock-up shall be completed successfully prior to installation.

G. Site Design Requirements: Plan exterior hardscape to reduce urban heat island effect. Use materials with an SRI of 35 or greater and reduce the overall amount of asphalt as feasible.
1. Reduce dimensions of 25% of parking stalls to meet compact stall requirements.
2. Use concrete at all pedestrian hardscape areas Colored concrete shall not have an SRI less than 29.

H. Energy Performance: Programmed basis of Design values should achieve 15-20% energy cost performance over ANSI/IESNA/ ASHRAE 90.1-2010. Supporting documentation must be submitted for Owner review and approval.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Division One Requirements consist of Contract administration normally associated with the following technical sections

012500 SUBSTITUTION PROCEDURES

012600	CONTRACT MODIFICATION PROCEDURES
012900	PAYMENT PROCEDURES
013200	CONSTRUCTION PROGRESS DOCUMENTATION
013233	PHOTOGRAPHIC DOCUMENTATION
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015000	TEMPORARY FACILITIES AND CONTROLS
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017300	EXECUTION
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019113	GENERAL COMMISSIONING REQUIREMENTS

B. Construction Waste Management Plan is required to divert 75% of construction waste by volume from the landfill.

C. Indoor Environment Quality shall comply with SMACNA IAQ Guidelines for Occupied Buildings under Construction. ANSI/SMACNA 008-2008

D. Work by Owner:

1. Preceding Work: TBD
2. Concurrent Work: TBD
3. Subsequent Work: TBD

E. Work Under Separate Contracts:

1. Preceding Work: TBD
2. Concurrent Work: TBD
3. Subsequent Work: TBD

F. Purchase Contracts: As outlined within the document and TBD.

G. Owner-Furnished Products: As outlined within the document and TBD.

H. Contractor-Furnished, Owner-Installed Products: As outlined within the document and TBD.

I. Use of Site: Limited to work in areas indicated.

1. Limits of Site Disturbance: 40 feet (12.2 m) beyond building; 10 feet (3 m) beyond surface paving and utilities; 15 feet (4.5 m) beyond roadway and main utility branch trenches; 25 feet (7.6 m) beyond constructed permeable surfaces (such as pervious paving, stormwater detention facilities, and playing fields).
2. Owner occupancy allowed.

J. Owner's Occupancy Requirements: **Partial** Owner occupancy.

1. Owner occupancy of completed areas of construction.

K. Work Restrictions: TBD

L. Miscellaneous Provisions: TBD

END OF SECTION 011000

SECTION 018113 - SUSTAINABLE DESIGN REQUIREMENTS

1.1 SUMMARY

A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED Silver certification based on USGBC's "LEED 2009 for New Construction & Major Renovations."

1. Other LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
4. Specific requirements for LEED are included in greater detail in other Sections.

1.2 DEFINITIONS

A. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.

B. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

C. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the project's LEED certification application. Document responses as informational submittals.

1.4 ACTION SUBMITTALS

A. General: Submit additional LEED submittals required by other Specification Sections.

B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.

C. LEED Documentation Submittals:

1. Credit MR 2: Comply with Section 017419 "Construction Waste Management and Disposal."
2. Credit MR 4: Product data and certification letter from product manufacturers indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating material cost for each product having recycled content.
3. Credit MR 5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.5 INFORMATIONAL SUBMITTALS

A. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:

1. Plumbing.
2. Mechanical.
3. Electrical.
4. Specialty items such as elevators and equipment.
5. Wood-based construction materials.

B. LEED Action Plans: Provide preliminary submittals within 14 days of date established for commencement of the Work indicating how the following requirements will be met:

1. Credit MR 2: Waste management plan complying with Section 017419 "Construction Waste Management and Disposal."
2. Credit MR 4: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
3. Credit MR 5: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.

C. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:

1. Credit MR 2: Waste reduction progress reports complying with Section 017419 "Construction Waste Management and Disposal."
2. Credit MR 4: Recycled content.
3. Credit MR 5: Regional materials.

1.6 QUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

1.7 MATERIALS, GENERAL

A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.

1.8 RECYCLED CONTENT OF MATERIALS

A. Credit MR 4: Building materials shall have recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content for Project constitutes a minimum of 20 percent of cost of materials used for Project.

1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
2. Do not include furniture, plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

1.9 REGIONAL MATERIALS

A. Credit MR 5: Not less than 20 percent of building materials (by cost) shall be regional materials.

1.10 CONSTRUCTION WASTE MANAGEMENT

A. Credit MR 2: Comply with Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 018113

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

1.1 SUMMARY

A. Commissioning Team:

1. Members representing **each** contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists.
2. Members representing Owner, including CxA, facility user and operation and maintenance personnel, and Architect and engineering design professionals.

B. Owner's Responsibilities:

1. Provide OPR and BoD documentation.
2. Assign operation and maintenance personnel and schedule them for commissioning activities.

C. Contractor's Responsibilities: Assign personnel and schedule them for commissioning activities.

D. CxA's Responsibilities:

1. Organize and lead commissioning team.
2. Provide commissioning plan.
3. Convene commissioning team meetings.
4. Provide Project-specific checklists and test procedures.
5. Verify the execution of commissioning process activities using random sampling.
6. Prepare and maintain Issues Log.
7. Prepare and maintain completed construction checklist log.
8. Witness systems, assemblies, equipment, and component startup.
9. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

END OF SECTION 019113

SECTION 033000 - CAST-IN-PLACE CONCRETE

1.1 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Walls and columns.
5. Suspended slabs and beams.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.3 QUALITY ASSURANCE

A. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

B. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship.

1. Build panel approximately 200 sq. ft. for slab-on-grade and 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
2. Approved panels may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.

b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

1.5 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

D. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

1.6 FIBER REINFORCEMENT

A. Synthetic Micro-Fiber: fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches (25 to 57 mm) long.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Fibrillated Micro-Fibers:

1) Grace Construction Products, W. R. Grace & Co.; Grace Fibers.

1.7 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size 1.5 inches
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

1.8 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

1.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

1.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

1.11 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E 1745, Class A with a nominal perm rating not exceeding 0.03. Include manufacturer's recommended adhesive or pressure-sensitive tape.

END OF SECTION 033000

SECTION 034500 - PLANT-PRECAST ARCHITECTURAL CONCRETE

1.1 SUMMARY

A. This Section includes the following:

1. Precast architectural concrete units

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide precast architectural concrete units and connections capable of withstanding design loads within limits and under conditions indicated. See structural drawings for applicable design criteria.
   1. Design framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements.
   2. Panels at parking levels shall be designed to withstand vehicle impact loads defined in ASCE-7.

1.3 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.4 MOLD MATERIALS

A. Molds: Provide molds and, where required, form-facing materials of metal, plastic, wood, or another material that is nonreactive with concrete and dimensionally stable to produce continuous and true precast concrete surfaces within fabrication tolerances and suitable for required finishes.

1.5 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Plain-Steel Wire: ASTM A 82, as drawn.

D. Supports: Manufacturer's bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to CRSI's "Manual of Standard Practice," PCI MNL 117, and as follows:

1. For uncoated reinforcement, use all-plastic bar supports.

E. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

1.6 PRESTRESSING TENDONS

A. Prestressing Strand: ASTM A 416/A 416M, Grade 250 or 270, uncoated, 7-wire, low-relaxation strand.

1.7 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type III, white, of same type, brand, and source.

1. Standard gray portland cement may be used for nonexposed backup concrete.

B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S.

1. Face-Mix Fine Aggregates: Selected, natural or manufactured sand of the same material as coarse aggregate, unless otherwise approved by Architect.

C. Lightweight Aggregates: Except as modified by PCI MNL 117, ASTM C 330, with absorption less than 11 percent.

D. Coloring Admixture: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.

1.8 FABRICATION TOLERANCES

A. Fabricate precast architectural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

B. Fabricate precast architectural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with the following product tolerances:

1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:

a. 20 feet or under, plus or minus 1/8 inch.
b. 20 to 40 feet, plus or minus 1/4 inch.

END OF SECTION 034500

SECTION 034900 - GLASS FIBER REINFORCED CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glass fiber reinforced concrete (GFRC) units consisting of GFRC cornice panels, panel frames, anchors, and connection hardware.

1. GFRC trim units mounted to cold formed metal framing.

2. Exterior column covers

1.2 DEFINITIONS

A. Design Reference Sample: Sample of approved GFRC color, finish, and texture; preapproved by Architect.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide GFRC panels, including panel frames, anchors, and connections, capable of withstanding the following design loads as well as the effects of thermal- and moisture-induced volume changes, according to load factors and combinations established in PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."

1. Design Loads: Calculated from Design criteria
2. Deflection: Design panel frames to withstand design loads without lateral deflections greater than 1/240 of wall span.
3. Thermal Movements: Provide for thermal movements resulting from annual ambient temperature changes of 100 deg F.
4. Design panel frames and connections to accommodate deflections and other building movements including seismic story drifts.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer who participates in PCI's Plant Certification Program and is designated a PCI-Certified Plant for Group G - Glass Fiber Reinforced Concrete.

B. Source Limitations: Obtain GFRC panels through one source from a single manufacturer.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel," and AWS D1.3, "Structural Welding Code - Sheet Steel."

D. PCI Manuals: Comply with requirements and recommendations in the following PCI manuals unless more stringent requirements are indicated:

1. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."

2. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products."

1.5 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, nonabsorptive material, warp and buckle free, that will provide continuous and true GFRC surfaces; nonreactive with GFRC and capable of producing required finish surfaces.

1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent surface or joint treatments of GFRC.

B. Form Liners: Units of face design, texture, arrangement, and configuration to match GFRC design reference sample. Provide solid backing and form supports to ensure that form liners remain in place during GFRC application. Use with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent surface or joint treatments of GFRC.

1.6 GFRC MATERIALS

A. Portland Cement: ASTM C 150, Type I, II, or III.

1. For surfaces exposed to view in finished structure, use white of same type, brand, and source throughout GFRC production.
2. Metakaolin: ASTM C 618, Class N.

B. Glass Fibers: Alkali resistant, with a minimum zirconia content of 16 percent, 1 to 2 inches long, specifically produced for use in GFRC, and complying with PCI MNL 130.

C. Sand: Washed and dried silica, complying with composition requirements of ASTM C 144; passing No. 20 sieve with a maximum of 2 percent passing No. 100 sieve.

D. Facing Aggregate: ASTM C 33, except for gradation, and PCI MNL 130, 1/4-inch maximum size.

1. Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match sample.

E. Coloring Admixture: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.

1.7 ANCHORS, CONNECTORS, AND MISCELLANEOUS MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M. Finish steel shapes and plates less than 3/16 inch thick as follows:

1. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, or ASTM A 153/A 153M, as applicable.

B. Carbon-Steel Bars: ASTM A 108, AISI Grade 1018. Finish steel bars less than 3/16 inch thick as follows:

1. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, or ASTM A 153/A 153M, as applicable.

C. Malleable-Iron Castings: ASTM A 47/ A 47M Grade 32510.

D. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30.

E. Bolts: ASTM A 307 or ASTM A 325.

1. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, and ASTM A 153/A 153M, as applicable.

F. Reglets: PVC extrusions.

1.8 FRAME MATERIALS

A. Cold-Formed Steel Framing: Manufacturer's standard C-shaped steel studs, complying with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," minimum uncoated steel thickness of 0.0538 inch, with stiffened flanges, U-shaped steel track, and of the following steel sheet:

1.9 GFRC MIXES

A. Backing Mix: Proportion backing mix of portland cement, glass fibers, sand, and admixtures to comply with design requirements. Provide nominal glass-fiber content of not less than 5 percent by weight of total mix.

B. Face Mix: Proportion face mix of portland cement, sand, facing aggregates, and admixtures to comply with design requirements.

C. Mist Coat: Portland cement, sand slurry, and admixtures; of same proportions as backing mix without glass fibers.

D. Polymer-Curing Admixture: 6 to 7 percent by weight of polymer-curing admixture solids to dry portland cement.

E. Air Content: 8 to 10 percent; ASTM C 185.

F. Coloring Admixture: Not to exceed 10 percent of cement weight.

1.10 FABRICATION TOLERANCES

A. Manufacturing Tolerances: Manufacture GFRC panels so each finished unit complies with the following dimensional tolerances. For dimensional tolerances not listed below, comply with PCI MNL 130.

1. Overall Height and Width of Units, Measured at the Face Adjacent to Mold: As follows:

a. 10 feet or less, plus or minus 1/8 inch.
b. More than 10 feet, plus or minus 1/8 inch per 10 feet; 1/4 inch maximum.

2. Edge Return Thickness: Plus 1/2 inch, minus 0 inch.

3. Architectural Facing Thickness: Plus 1/8 inch, minus 0 inch.
4. Backing Thickness: Plus 1/4 inch, minus 0 inch.
5. Unit Depth from Face of Skin to Back of Frame or Integral Rib: Plus 3/8 inch, minus 1/4 inch.
6. Angular Variation of Plane of Side Mold: Plus or minus 1/32 inch per 3 inches of depth or plus or minus 1/16 inch total, whichever is greater.
7. Variation from Square or Designated Skew (Difference in Length of Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches or plus or minus 1/4 inch total, whichever is greater.
8. Local Smoothness: 1/4 inch per 10 feet.
9. Bowing: Not to exceed L/240 unless unit meets erection tolerances using connection adjustments.
10. Length and Width of Block Outs and Openings within One Unit: Plus or minus 1/4 inch.
11. Maximum Permissible Warpage of One Corner out of the Plane of the Other Three: 1/16 inch per 12 inches of distance from nearest adjacent corner.

B. Position Tolerances: Measured from datum line locations, as indicated on Shop Drawings.

1. Frame and Track: Plus or minus 1/4 inch.
2. Flashing Reglets at Edge of Unit: Plus or minus 1/4 inch.
3. Inserts: Plus or minus 1/2 inch.
4. Special Handling Devices: Plus or minus 3 inches.
5. Location of Bearing Devices: Plus or minus 1/4 inch.
6. Blockouts: Plus or minus 3/8 inch.

C. Unit Frame Tolerances: As follows:

1. Vertical and Horizontal Alignment: 1/4 inch per 10 feet.
2. Spacing of Framing Member: Plus or minus 3/8 inch.
3. Squareness of Frame: Difference in length of diagonals of 3/8 inch.
4. Overall Size of Frame: Plus or minus 3/8 inch.

1.11 FINISHES

A. Finish exposed-face surfaces of GFRC to match approved design reference sample and mockups. Panel faces shall be free of joint marks, grain, or other obvious defects.

END OF SECTION 034900

SECTION 042113 - BRICK MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Face brick.
2. Precast trim units.
3. Mortar and grout.
4. Ties and anchors.
5. Embedded flashing.
6. Miscellaneous masonry accessories.

1.2 ACTION SUBMITTALS

A. LEED Submittals:

1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.3 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1.4 BRICK

A. General: Provide shapes indicated and as follows for each form of brick required:

B. Face Brick: ASTM C 216 Grade SW,: Type HBS

1. Unit Compressive Strength: Per General Structural Notes.

2. Initial Rate of Absorption: Less than 20 g/30 sq. in. (20 g/194 sq. cm) per minute when tested per ASTM C 67.

3. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet (3 m).

1.5 PRECAST TRIM UNITS

A. 5000 PSI Architectural Concrete.

1. Description: Color and finish as directed by Architect.

B. Provide units accurately shaped, with exposed faces dressed true.

1.6 MORTAR MATERIALS

A. Colored Cement Product: Packaged blend made from masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color as selected by Architect.

2. Pigments shall not exceed 5 percent of masonry cement by weight.

3. Available Products:

a. Colored Masonry Cement:

1) Capital Materials Corporation; Flamingo Color Masonry Cement.
2) Essroc, Italcementi Group; Brixment-in-Color.
3) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
4) Lafarge North America Inc.; Florida Custom Color Masonry or Magnolia Masonry Cement.
5) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.
6) National Cement Company, Inc.; Coosa Masonry Cement.

B. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.

2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

C. Aggregate for Grout: ASTM C 404.

D. Water: Potable.

1.7 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1.8 TIES AND ANCHORS

A. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint and penetrate outboard insulation minimizing thermal bridging in the assembly.

1.9 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with **SMACNA's "Architectural Sheet Metal Manual"** and as follows:

1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch (0.40 mm) thick.

1.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Weep/Vent Products: Use **one of** the following :
1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.

B. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1.11 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

END OF SECTION 042113

SECTION 042129 - ARCHITECTURAL TERRA COTTA

1.1 SUMMARY

A. Section Includes:

1 Terra Cotta Rainscreen system as an option for exterior finish.

2. Detail, furnish, and install support, anchorage, and connection devices and coordinate size and configuration with other elements of the work.

1.2 REFERENCES

A. ASTM C212 – Standard Specification for Structural Clay Facing Tile.

B. ASTM C126 – Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.

C. ASTM C67 – Standard Methods of Sampling and Testing Brick and Structural Clay Tile.

1.3 QUALITY ASSURANCE

A. Contractor Qualifications:
All work shall be performed by mechanics experienced in the handling and setting of the material having not less than five (5) years satisfactory experience in comparable installation of new Terra Cotta including work on at least two (2) projects similar in scope and scale to this Project.

1. Submit references with name of contact person and telephone number for the two (2) submitted similar projects.

B. Manufacturer's Qualifications:

1. All Terra Cotta work shall be by a manufacturing firm normally in business of producing work of the type indicated and shall be capable of submitting proof to the Architect/Engineer as follows:

   a. Length of Time in this Kind of Manufacturing: Five (5) years.
   b. Photographs and Job Description: At least three (3) previous jobs.

C. Installer's Qualifications:

1. All Terra Cotta work shall be installed by a firm normally in business of installing work of the type indicated and shall be capable of submitting proof to the Architect as follows:

a. Length of Time in this Kind of Installation: Ten (10) years.
b. Photographs and Job Description: At least two (2) previous jobs.

D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of typical exterior wall area as shown on Drawings or not less than 72 inches (1800 mm) long by 48 inches (1200 mm) high.

   a. Include typical components, attachments to building structure, and methods of installation.
   b. Include window opening with trim.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 ACTION SUBMITTALS

A. LEED Submittals:

1 Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

B. Calculations prepared by a Utah Licensed Professional Engineer responsible for or having direct supervision over the production of calculations, and any other item or issue pertinent to the wallpanel system design

1.5 TERRA COTTA AND ACCESSORIES

A. Manufacturers offering products single or double wall terra cotta that may be incorporated into the work, subject to requirements with requirements, include the following:

Avenere Cladding
NeaCera
NBK
Shildan
Terreal

B Terra Cotta Specifications

Test Average (based on 10 Samples)	Method	Criteria
Compressive Strength – 6000 psi	ASTM C67	ASTM C126
Absorption (5 hour boil) 11.5%	ASTM C67	
Absorption (24 hour soak) 7.5%	ASTM C67	
Saturation Coefficient - .69	ASTM C67	
Craze Resistance	ASTM C126	
Glaze absorption - .15%	ASTM C67	
Freeze/thaw resistance	ASTM C67	300
Cycles without degradation		

1.6 FRAMING FOR BACKUP STRUCTURE

A. Metal-Grid Systems: Manufacturer's standard integrated system that combines metal struts, fittings, fasteners, and stone anchors and is engineered expressly for mechanically installing dimension stone cladding.

1. Struts: System manufacturers standard conponents with a minimum requirement of Cold-formed metal channels with continuous slot complying with MFMA-4, of size and shape required for application indicated, made from galvanized steel complying with ASTM A 653/A 653M, with G90 (Z275) coating, and not less than 0.108-inch (2.74-mm) nominal thickness
2. Fittings and Fasteners: System manufacturer's standard components of design, size, and material required to securely attach struts to building structure, by method indicated or selected, and stone anchors to struts, as well as to prevent galvanic corrosion. Fabricate components in contact with terra cotta from same material specified for anchors.
3. Anchors: Shapes and sizes standard with system manufacturer, complying with "Anchors and Fasteners" Article.

1.7 ANCHORS AND FASTENERS

A. Fabricate anchors, including shelf angles, from stainless steel, ASTM A 240/A 240M or ASTM A 666, Type 304; temper as required to support loads imposed without exceeding allowable design stresses. Fabricate dowels and pins for anchors from stainless steel, ASTM A 276, Type 304.

B. Postinstalled Anchor Bolts for Concrete and Masonry: torque-controlled expansion anchors or undercut anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4) for bolts and nuts; ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304 or 316, for anchors, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1.8 ACCEPTANCE

A. The completed installation shall have the acceptance of the Architect and Owner. Remove and replace units that are chipped, cracked, or otherwise damaged which do not conform to the Specification Requirements.

END OF SECTION 042129

SECTION 042200 - CONCRETE UNIT MASONRY

1.1 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units.
2. Mortar and grout.
3. Reinforcing steel.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.
7. Through wall flashing.

1.2 SUBMITTALS

A. LEED Submittals:

1. Credits MR 4.1 and 4.2: For products having recycled content, manufacturer's documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Credit MR 5.1 and 5.2: Submit the locations of manufacturing and harvest, extraction or recovery for all products manufactured within 500 miles that also contain raw materials harvested, extracted or recovered within 500 miles. Submit distances in miles, as the crow flies, from the harvest/extraction/recovery site and from the manufacturing site to the Project.

   a. Submit cut sheet and/or letter from manufacturer verifying locations.
   b. Include statement indicating cost for each material and the fraction by weight that is considered regional.

3. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

4. Credit IEQ 4.2: Product data for paints and coatings applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

B. Samples for Initial Selection: For the following:

1. Unit masonry Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
2. Mortar Samples showing the full range of natural colored mortar available.

C. Samples for Verification: For the following:

1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
2. Mortar Samples. Make samples using the same sand and mortar ingredients to be used on Project
3. Weep holes/vents in color to match mortar color.

4. Accessories embedded in the masonry.

D. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

F. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

1. Each type of masonry unit required.

a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.

2. Mortar complying with property requirements of ASTM C270.
3. Grout mixes complying with compressive strength requirements of ASTM C 476
4. Include description of type and proportions of grout ingredients.

G. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each type of masonry unit required.

a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.

2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
4. Each material and grade indicated for reinforcing bars.
5. Each type and size of joint reinforcement.
6. Each type and size of anchor, tie, and metal accessory.

1.3 QUALITY ASSURANCE

A. Mockups: For fullscale mockup provide typical wall components to evaluate envelope, construction methods and conditions Large scale mock-up as required by other sections of these specifications.

1.4 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, or other special conditions.

2. All outside corners of exposed units to be factory fabricated bullnose configuration.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2900 psi.
2. Weight Classification: Light weight.
3. 1 hour rated where required.
4. Type: Honed and filled finish on face exposed to public view, standard finish on face exposed to back-of-house view.
5. Manufacturers: Manufacturers that may be utilized in the Work include, but are not limited to, the following:

   a. Amcor Masonry Products.
   b. Buehner Block.
   c. Lehi Block.
   d. Sunroc.

6. Integral water repellent admixture that does not affect flexural strength required for units where units remain exposed.

1.5 MORTAR AND GROUT MATERIALS

A. Regional Materials: Aggregate for mortar and grout that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

F. Colored Cement Product: Packaged blend made from Portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Products: Provide one of the following:

   a. Colored Portland Cement-Lime Mix:

1) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
2) Promix Quikrete Pre-blended mortar
3) Ash Grove Packaging,

2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
3. Pigments shall not exceed 10 percent of portland cement by weight.

G. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

H. Aggregate for Grout: ASTM C 404.

I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Euclid Chemical Company (The); Accelguard 80.
b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.

J. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ACM Chemistries, Inc.; RainBloc for Mortar.
b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

K. Water: Potable.

1.6 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and Division 07 Section "Sheet Metal Flashing and Trim" and as follows:

1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch (0.40 mm) thick.
2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.

END OF SECTION 042000

SECTION 051200 - STRUCTURAL STEEL FRAMING

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

1.2 PERFORMANCE REQUIREMENTS

A. Moment Connections: Type FR, fully restrained.

B. Construction: Moment frame.

1.3 SUBMITTALS

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.4 STRUCTURAL-STEEL MATERIALS

A Recycled Content of Steel Products: Provide products with an average recycled content of steel products, so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:

1. W-Shapes: 60 percent.
2. Channels, Angles: 60 percent.
3. Plate and Bar: 25 percent.
4. Cold-Formed Hollow Structural Sections: 25 percent.
5. Steel Pipe: 25 percent.
6. All Other Steel Materials: 25 percent.

B. W-Shapes: ASTM A 992/A 992M

C. Channels, Angles Shapes: ASTM A 36/A 36M.

D. Plate and Bar: ASTM A 36/A 36M and ASTM A 572/A 572M, Grade 50 and 42.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

F. Welding Electrodes: Comply with AWS requirements.

1.5 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with galvanized finish

B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

C. Unheaded Anchor Rods: As indicated.

1. Configuration: Straight.
2. Nuts: ASTM A 563 heavy-hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: galvanized.

1.5 PRIMER

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Galvanizing Repair Paint: ASTM A 780.

1.6 GROUT

A Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

1.7 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

1.8 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material

1.9 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

END OF SECTION 051200

SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

1.1 SUMMARY

A. Section includes architecturally exposed structural-steel framing

1. Requirements in Division 05 Section "Structural Steel Framing" also apply to AESS framing.

1.2 DEFINITIONS

A. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

B. Category 1 AESS: AESS that is within 96 inches (2400 mm) vertically and 36 inches (900 mm) horizontally of a walking surface and is visible to a person standing on that walking surface

C. Category 2 AESS: AESS that is within 20 feet (6 m) vertically and horizontally of a walking surface and is visible to a person standing on that walking surface.

D. Category 3 AESS: AESS that is not defined as Category 1 or Category 2 or that is designated as "Category 3 architecturally exposed structural steel".

1.3 SUBMITTALS

A. Samples: Submit samples of AESS to set quality standards for exposed welds

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.4 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

B. In addition to special care used to handle and fabricate AESS, comply with the following:

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
2. Grind sheared, punched, and flame-cut edges of **Category 1** AESS to remove burrs and provide smooth surfaces and edges.
3. Fabricate **Category 1 and 2** AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.

4. Fabricate **Category 1 and Category 2** AESS with exposed surfaces free of seams to maximum extent possible.
5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
7. Fabricate **Category 1 and 2** AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
8. Seal-weld open ends of hollow structural sections with 3/8-inch (9.5-mm) closure plates for **Category 1** AESS.
9. Weld threaded nuts to framing and other specialty items indicated to receive other work.

1.5 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where **Category 1 and 2 AESS** is exposed to weather.
4. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch (plus 1.5 mm, minus 0 mm) for AESS.
5. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch (plus 1.5 mm, minus 0 mm) for AESS. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
6. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
7. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
8. Make fillet welds for AESS oversize and grind to uniform profile with smooth face and transition.

1.6 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

B. Surface Preparation **for Nongalvanized Steel**: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."

END OF SECTION 051213

SECTION 052100 - STEEL JOISTS

0.1 SUMMARY:

A. Section Includes:

1. K-series steel joists.
2. K-series steel joist substitutes.
3. Joist Accessories

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0.2 SUBMITTALS:

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Laboratory Test Reports for Credit EQ 4: For primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 MATERIALS:

A. Steel: Comply with SJI "Specifications".

B. Steel Prime Paint: Comply with SJI "Specifications", except asphaltic paint is not acceptable.

1.4 FABRICATION:

A. General: Fabricate steel joists in accordance with SJI "Specification".

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

C. Extended Ends: Provide extended ends on joists where shown, complying with manufacturer's standards and requirements of applicable SJI "Specifications" and load tables.

D. Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with SJI "Specifications".

1. Provide horizontal type bridging where required to accommodate ductwork between joists. Coordinate with ductwork installer.

E. Provide bridging anchors for ends of bridging lines terminating at walls or beams.

F. End Anchorage: Provide end anchorages including bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications", unless otherwise indicated.

G. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

H. Apply one shop coat of steel prime paint to joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

I. Do not Paint steel joists indicated to receive sprayed-on fireproofing.

END OF SECTION 052100

SECTION 053100 - STEEL DECKING

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Composite floor deck.

1.2 ACTION SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4.1 and 4.2: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. Product Certificates for Credit MR 5.1 and **5.**2: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.3 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

1.4 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASC Profiles, Inc.; a Blue Scope Steel company.
2. Nucor Corp.; Vulcraft Group.
3. Verco Manufacturing Co.

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.

1.5 COMPOSITE FLOOR DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASC Profiles, Inc.; a Blue Scope Steel company.
2. Nucor Corp.; Vulcraft Group.
3. Verco Manufacturing Co.

B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 (230) minimum, with top surface phosphatized and unpainted and underside surface shop primed with manufacturers' standard gray or white baked-on, rust-inhibitive primer.
2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: As indicated.

1.6 ACCESSORIES

C. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

D. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior non-load-bearing wall framing.

1.2 SUBMITTALS

A. LEED Submittal:

   1. Product Data for Credit MR 4.1and 4.2 : For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

      a. Include statement indicating costs for each product having recycled content.

   2. Product Certificates for Credit MR 5.1 and **5.2**: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional..

1.3 MANUFACTURERS

A. Available Manufacturers:

   1. Allied Studco.
   2. AllSteel Products, Inc.
   3. California Expanded Metal Products Company.
   4. Clark Steel Framing.
   5. Consolidated Fabricators Corp.; Building Products Division.
   6. Craco Metals Manufacturing, LLC.
   7. Custom Stud, Inc.
   8. Dale/Incor.
   9. Design Shapes in Steel.
   10. Dietrich Metal Framing; a Worthington Industries Company.
   11. Formetal Co. Inc. (The).
   12. Innovative Steel Systems.
   13. MarinoWare; a division of Ware Industries.
   14. Quail Run Building Materials, Inc.
   15. SCAFCO Corporation.
   16. Southeastern Stud & Components, Inc.
   17. Steel Construction Systems.
   18. Steeler, Inc.
   19. Super Stud Building Products, Inc.
   20. United Metal Products, Inc.

1.4 MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than **25** percent.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: **ST33H (ST230H)**
2. Coating: **G60 (Z180), A60 (ZF180), AZ50 (AZ150), or GF30 (ZGF90)**

C. Steel Sheet for **Vertical Deflection and Drift** Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: **50 (340), Class 1 or 2**.
2. Coating: G90 (Z275).

1.5 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness 16 gauge

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as indicated.

C. Vertical Deflection Clips: Manufacturer's standard **bypass** clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dietrich Metal Framing; a Worthington Industries Company.
b. MarinoWare, a division of Ware Industries.
c. SCAFCO Corporation
d. The Steel Network, Inc.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: As indicated on drawings.
2. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.

E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

1.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

1.1 SUMMARY

A. This Section includes the following:

1. Steel framing and supports for operable partitions.
2. Steel framing and supports for overhead doors and grilles.
3. Steel framing and supports for countertops.
4. Steel framing and supports for mechanical and electrical equipment.
5. Steel framing and supports for applications where framing and supports are not specified in other Sections.
6. Steel framing and supports (outriggers) for window-washing equipment including mounting brackets and anchorages.
7. Mounting brackets and anchorages for window-washing equipment.
8. Elevator machine beams, hoist beams, and divider beams.
9. Steel shapes for supporting elevator door sills.
10. Metal ladders.
11. Miscellaneous steel trim including steel angle corner guards steel edgings and loading-dock edge angles.
12. Metal bollards.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4.1and 4.2: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

2. Product Certificates for Credit MR 5.1 and **5.2**: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.3, "Structural Welding Code--Sheet Steel."
4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.4 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

C. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

D. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.

1. Size of Channels: **1-5/8 by 1-5/8 inches (41 by 41 mm)** unless otherwise **indicated**.
2. Material: Galvanized steel complying with ASTM A 653/A 653M, **structural steel, Grade 33**, with G90 (Z275) coating; **0.079-inch (2-mm)** nominal thickness.

E. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

F. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1.5 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

D. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.

G. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).

H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1 (ASME B18.21.2M).

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

END OF SECTION 055000

SECTION 055100 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Preassembled interior steel stairs with concrete-filled treads designed and engineered to comply with local codes.

2. Ornamental Steel Framed Stairs

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of metal stairs.

1. Treads and Platforms of Metal Stairs: Capable of withstanding a uniform load of 100 lbf/sq. ft. (4.79 kN/sq. m) or a concentrated load of 300 lbf (1.33 kN) on an area of 4 sq. in. (25.8 sq. cm), whichever produces the greater stress.
2. Stair Framing: Capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads.
3. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch (6.4 mm), whichever is less.
4. Seismic drift connections are required at base of all multi-story stairs.

B. Seismic Performance: All multi-story assemblies require seismic drift connections at base of all runs.

1.4 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credits MR 4.1 and 4.2: For products having recycled content, manufacturer's documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

a. Include statement indicating cost for each product containing steel.

2. Product Certificates for Credit MR 5.1 and 5.2: Submit the locations of manufacturing and harvest, extraction or recovery for all products manufactured within 500 miles that al-

so contain raw materials harvested, extracted or recovered within 500 miles. Submit distances in miles, as the crow flies, from the harvest/extraction/recovery site and from the manufacturing site to the Project.

a. Submit cut sheet and/or letter from manufacturer verifying locations.
b. Include statement indicating cost for each material and the fraction by weight that is considered regional.

3. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.
4. Credit IEQ 4.2: Product data for paints and coatings applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

1.5 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

1.6 FERROUS METALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500 or hot-form steel tubing complying with ASTM A 501.

D. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.

E. Uncoated, Cold-Rolled Steel Sheet: Commercial quality, complying with ASTM A 366/A 366M; or structural quality, complying with ASTM A 611, Grade A, unless another grade is required by design loads.

F. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

G. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1.7 CONCRETE FILL AND REINFORCING MATERIALS

A. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless higher strengths are indicated.

B. Welded Wire Fabric: ASTM A 185, 6 by 6 inches (152 by 152 mm)--W1.4 by W1.4, unless otherwise indicated.

1.8 STEEL-FRAMED STAIRS

A. Stair Framing: Fabricate stringers of structural-steel channels, tubes, and/or plates, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural-steel channel or tube steel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

1. Steel Sheet: Uncoated cold-rolled steel sheet, unless otherwise indicated.
2. Directly weld metal pans to stringers; locate welds on side of subtreads to be concealed by concrete fill. Do not weld risers to stringers.
3. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
4. Shape metal pans to include non-slip nosing integral with riser.
5. Provide subplatforms of configuration indicated or, if not indicated, the same as sub-treads. Weld subplatforms to platform framing.

END OF SECTION 055100

SECTION 055213 – PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes pipe and tube railings of material and finish as noted below:

1. Steel pipe and tube railing.
2. Stainless steel pipe and tube railings

1.3 DEFINITIONS

A. Definitions in ASTM E 985 for railing-related terms apply to this Section.

1.4 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credits MR 4.1 and 4.2: For products having recycled content, manufacturer's documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

   a. Include statement indicating cost for each product containing steel.

2. Product Certificates for Credit MR 5.1 and 5.2: Submit the locations of manufacturing and harvest, extraction or recovery for all products manufactured within 500 miles that also contain raw materials harvested, extracted or recovered within 500 miles. Submit distances in miles, as the crow flies, from the harvest/extraction/recovery site and from the manufacturing site to the Project.

   a. Submit cut sheet and/or letter from manufacturer verifying locations.
   b. Include statement indicating cost for each material and the fraction by weight that is considered regional.

3. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.
4. Credit IEQ 4.2: Product data for paints and coatings applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

1.5 METALS

A. General: Provide metals free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.

B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:

1. Steel Tubing: Product type (manufacturing method) and as follows:

. Cold-Formed Steel Tubing: ASTM A 500.

2. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

. Type S or E, Grade B, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

3. Steel Plates, Shapes, and Bars: ASTM A 36.
4. Gray Iron Castings: ASTM A 48, Class 30.
5. Malleable Iron Castings: ASTM A 47, Grade 32510.
6. Woven Wire Mesh: Square pattern, 4-inch woven wire mesh, made from 0.125 nominal diameter wire complying with ASTM A 510 (ASTM A 510M).

1.6 STAINLESS STEEL

A. Tubing: ASTM A 554, Grade MT 316L.

B. Pipe: ASTM A 312/A 312M, Grade TP 316L.

C. Castings: ASTM A 743/A 743M, Grade CF 8M or CF 3M.

D. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316L

E. Brackets, Flanges, and Anchors: Cast or formed metal of the same material and finish as supported rails, unless otherwise indicated.

1. Anchor pipe for all handrails and guardrails shall be stainless steel.

END OF SECTION 055213

SECTION 057300 – DECORATIVE METAL RAILINGS

1.1 SUMMARY

A. This Section includes:

1. Glass / metal railing system.

1.2 PERFORMANCE REQUIREMENTS

A. In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Stainless Steel: 60 percent of minimum yield strength.
2. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage).

B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:
   a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
   b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
   c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:
   a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
   b. Infill load and other loads need not be assumed to act concurrently.

3. Glass-supported Railings: Support each section of top rail by a minimum of three glass panels or by other means so top rail will remain in place if any one panel fails.

1.3 SUBMITTALS

1. LEED Submittals: Recycled Content: In accordance with LEED credit MRc4 use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent according to LEED credit MRc4 of the total monetary value of each material and product. The value of a material assembly's recycled content shall be determined by weight. The recycled fraction of an assembly is then multiplied by the cost of the assembly so as to determine the recycled content value.
   a. Submit Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

B. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 GLASS / METAL RAILING SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Glass- and Plastic-Supported Railings:
Architectural Metal Works.
Blum, Julius & Co., Inc.
Blumcraft of Pittsburgh.
CraneVeyor Corp.
Livers Bronze Co.
Newman Brothers, Inc.

B. Material: Stainless steel; AISI type 304; surface preparation #6 (240 grain) flat finish.

C. Fabrication:

1. Fabricate railing system for compliance with structural requirements of applicable codes and applicable requirements of ASTM E 985.
2. Pre-assemble railings prior to shipping to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and for coordination with Shop Drawings.
3. Make tubing cuts square, without burrs and, where exposed, rounded to produce smooth, rigid and hairline joints.

1.5 GLASS AND GLAZING MATERIALS

A. Glass: Tempered glass, thickness as required; polished edges; Dubbed (blunt) corners.

B. Manufacture tempered glass by horizontal (roller hearth) process.

END OF SECTION 057300

SECTION 061000 - ROUGH CARPENTRY

1.1 SUMMARY

A. This Section includes the following:

1. Wood nailers and blocking. Fire treated and pressure treated where in contact with roofing, concrete or masonry construction.
2. Plywood backing panels for telephone equipment.

1.2 SUBMITTALS

A. LEED Submittals:

1. Credits MR 4.1 and 4.2: For products having recycled content, manufacturer's documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

   a. Include statement indicating cost for each product containing steel.

2. Credits MR 5.1 and 5.2: Submit the locations of manufacturing and harvest, extraction or recovery for all products manufactured within 500 miles that also contain raw materials harvested, extracted or recovered within 500 miles. Submit distances in miles, as the crow flies, from the harvest/extraction/recovery site and from the manufacturing site to the Project.

   a. Submit cut sheet and/or letter from manufacturer verifying locations.
   b. Include statement indicating cost for each material and the fraction by weight that is considered regional.

3. Credit MR 7: Invoices for permanently-installed wood products must conform to the requirements noted in Section 018113 "Sustainable Design Requirements".
4. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.
5. Credit IEQ 4.2: Product data for paints and coatings applied on site and located inside the weatherproofing system, indicating VOC content of each product used.
6. Credit IEQ 4.4: For composite wood products, documentation indicating that product contains no added urea formaldehyde.

1.3 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, the following:

1. Fire-Retardant-Treated Materials, Interior Type A:

   a. Baxter: J. H. Baxter Co.
   b. Chemical Specialties, Inc.
   c. Continental Wood Preservers, Inc.
   d. Hickson Corp.

e. Hoover Treated Wood Products, Inc.

2. Wood-Preservative-Treated Materials:

a. Baxter: J. H. Baxter Co.
b. Chemical Specialties, Inc.
c. Continental Wood Preservers, Inc.
d. Hickson Corp.
e. Hoover Treated Wood Products, Inc.
f. Osmose Wood Preserving, Inc.

1.4 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with applicable requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Research or Evaluation Reports: Provide fire-retardant-treated wood acceptable to authorities having jurisdiction and for which a current model code research or evaluation report exists that evidences compliance of fire-retardant-treated wood for application indicated.

B. Interior Type A: For interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:

1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested by a qualified independent testing agency.
2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
3. Contact with treated wood does not promote corrosion of metal fasteners.

1.5 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Do not use chemicals containing chromium or arsenic.

B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft.. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft..

D. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

1.6 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

E. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No.2 grade per SPIB.

1.7 STRUCTURAL-USE PANELS FOR BACKING

A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch thick.

END OF SECTION 061000

SECTION 061600 – PANEL SHEATHING

1.1 SUMMARY

A. This Section includes the following:

1. Glass-mat gypsum sheathing board for wall applications.
2. Cement based backer board for parapet applications.

1.2 SUBMITTALS

A. LEED Submittal:

1. Credits MR 4.1 and 4.2: For products having recycled content, manufacturer's documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

   a. Include statement indicating cost for each product containing steel.

2. Credits MR 5.1 and 5.2: Submit the locations of manufacturing and harvest, extraction or recovery for all products manufactured within 500 miles that also contain raw materials harvested, extracted or recovered within 500 miles. Submit distances in miles, as the crow flies, from the harvest/extraction/recovery site and from the manufacturing site to the Project.

   a. Submit cut sheet and/or letter from manufacturer verifying locations.
   b. Include statement indicating cost for each material and the fraction by weight that is considered regional.

3. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.
4. Credit IEQ 4.2: Product data for paints and coatings applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assembles with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

B. Sheathing Performance: Must allow for installation of Air Barrier without adversely affecting warranty.

C. Adhesives and Sealants: For products applied on site and located inside the weatherproofing system, comply with the VOC content limits noted in Section 018113 "Sustainable Design Requirements".

1.4 GYPSUM SHEATHING

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.

1. Product: Subject to compliance with requirements, provide one of the following:

   "Dens-Glass Gold" by G-P Gypsum Corporation.
   “GlasRoc” Gypsum Sheathing by Certainteed.
   “Securock” by USG.

2. Type and Thickness: Regular, 1/2 inch (13 mm) or Type X, 5/8 inch (15.9 mm),
3. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

1.5 CEMENT BACKER BOARD

A. Cementitious Backer Units: ANSI A118.9.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Custom Building Products; Wonderboard.
   b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
   c. United States Gypsum Co.; DUROCK Cement Board.

1.6 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
   b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.
   c. MFM Building Products Corp.; Window Wrap.
   d. Polyguard Products, Inc.; Polyguard 300.
   e. Protecto Wrap Company; BT-20 XL.

END OF SECTION 061600

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

1.1 SUMMARY

A. Interior standing and running trim.

B. Plastic-laminate cabinets and shelves.

C. Solid-surfacing-material countertops.

D. Wood paneling.

E. Laminated Plastic Laboratory tops.

F. Closet and Utility shelving.

1.2 ACTION SUBMITTALS

A. LEED Submittals:

1. In accordance with LEED credit MRc4 use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent according to LEED credit MRc4 of the total monetary value of each material and product. The value of a material assembly's recycled content shall be determined by weight. The recycled fraction of an assembly is then multiplied by the cost of the assembly so as to determine the recycled content value.
   a. Submit Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. In accordance with LEED credit IEQc4.1 adhesives and sealants used on the interior of the building shall be low-emitting type in accordance with the VOC limits of South Coast Air Quality Management District (SCAQMD) Rule #1168.
   a. Submit Product Data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
3. In accordance with LEED credit IEQc4.4 composite wood and agrifiber products used on the interior of the building shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
   a. Submit Product Data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain added urea-formaldehyde resin.
4. In accordance with LEED credit IEQc4.2 coatings used on the interior of the building shall be in accordance with the following: Architectural coatings applied to interior elements shall not exceed the VOC limits established in Green Seal Standard GS-11, First Edition.
   a. Clear wood finishes, stains, and primers applied to interior elements shall not exceed the VOC limits established in South Coast Air Quality Management District (SCAQMD) Rule #1113.
   b. Submit Product Data for coatings used inside the building indicating chemical composition and VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.

2.3 FABRICATION, GENERAL

A. Woodwork Grade: Unless otherwise indicated, provide Premium grade woodwork complying with AWI quality standard.

END OF SECTION 064023

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

1.1 SUMMARY

A. **Modified bituminous sheet**.

1.2 QUALITY ASSURANCE

A. Mockups for each type of waterproofing.

1.3 WARRANTY

A. Manufacturer's Warranty: **Five** years for materials only.

B. Installer's Warranty: **Two** years on specified form.

1.4 MATERIALS

A. Modified Bituminous Sheet: Minimum 60-mil (1.5-mm) nominal thickness, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side**; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction**.

1. Products: Subject to compliance with requirements, **provide one of the following**

   a. American Hydrotech, Inc.; VM75.
   b. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
   c. Grace, W. R., & Co. - Conn.; **Bituthene 3000/Low Temperature or Bituthene 4000**.
   d. Henry Company; Blueskin WP 100/200.

B. Auxiliary Materials:

1. Primer: **Waterborne**.
2. Metal Termination Bars: Aluminum.
3. Protection Course **Extruded-polystyrene board insulation, 1/2 inch (13 mm) thick**

1.5 INSTALLATION

A. Modified Bituminous Sheet: **One-ply** application.

1.6 FIELD QUALITY CONTROL

A. Inspections by C**ontractor**-engaged site representative.

B. Flood testing each deck area.

C. Testing Agency: **Contractor** engaged to observe flood testing.

END OF SECTION 071326

SECTION 071900 - WATER REPELLENTS

1.1 SUMMARY

A. Section includes penetrating water-repellent treatments for exterior cladding surfaces:

1.2 ACTION SUBMITTALS

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

B. Samples: For each type of water repellent and substrate indicated.

1.3 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at **Project site**

B. **5 Year warranty**.

1.4 PENETRATING WATER REPELLENTS

A. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, **provide one of the following**
   a. BASF Construction Chemicals, LLC; **Enviroseal Double 7 for Brick Enviroseal Double 7 HD**
   b. Degussa Corporation; Protectosil Aqua-Trete EM.
   c. Kryton International Inc., Kryton Group of Companies (The); Hydrostop WB.
   d. L&M Construction Chemicals, Inc.;**Aquapel Plus**.
   e. PROSOCO, Inc.; **Siloxane WB Concentrate**.
   f. Sika Corporation, Inc.; Sikagard 701W.
   g. Symons by Dayton Superior; Siloxane/Silane 10%.
   h. Tamms Industries, Inc., Euclid Chemical Company (The); **Baracade WB 244** .

1.5 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

B. Apply a heavy-saturation coating of water repellent, on surfaces indicated for treatment, using low-pressure spray to the point of saturation. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.

1. Precast Concrete and Cast Stone: At Contractor's option, first application of water repellent on units may be completed before installing them. Mask mortar and sealant bond surfaces to prevent water repellent from migrating onto joint surfaces.

C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

END OF SECTION 071900

SECTION 072100 - THERMAL INSULATION

1.1 SUMMARY

A. Section Includes continuous insulation to comply with IECC for a code-compliant envelope. Products that may be incorporated, include, but are not limited to, the following:

1. Foam-plastic board insulation.
2. Mineral-wool blanket insulation.
3. Loose-fill insulation.
4. Spray polyurethane foam insulation.
5. Vapor retarders.

1.2 ACTION SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.3 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Owens Corning.
d. Pactiv Building Products.

2. Type X, 15 psi (104 kPa).
3. Type IV, 25 psi (173 kPa).

1.4 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Roxul Inc.
4. Thermafiber.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Reinforced-Scrim -Faced, Mineral-Wool Blanket Insulation: ASTM C 665, Class A (faced surface with a flame-spread index of 25 or less per ASTM E 84); Category 1 (membrane is a vapor barrier), faced with foil scrim, or foil-scrim polyethylene.

1.5 LOOSE-FILL INSULATION

A. Glass-Fiber Loose-Fill Insulation: ASTM C 764 **Type II for poured application**; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

1.6 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. BASF Corporation.
b. BaySystems NorthAmerica, LLC.
c. Dow Chemical Company (The).
d. ERSystems, Inc.
e. Gaco Western Inc.
f. Henry Company.
g. NCFI; Division of Barnhardt Mfg. Co.
h. SWD Urethane Company.
i. Volatile Free, Inc.

2. Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).

1.7 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, **6 mils (0.15 mm)** thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m). Type I retarder as defined by IBCC 2012.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

END OF SECTION 072100

SECTION 072713 - MODIFIED BITUMINOUS SHEET AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes self-adhering, vapor-retarding, modified bituminous sheet air barriers, transition flashings and membranes, complete To maintain levels of air infiltration in compliance with 2012 IECC.

1.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier **and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration**. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.3 QUALITY ASSURANCE

A. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly including corner and roof of at least **150 sq. ft. (14 sq. m)**, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.

1.4 SELF-ADHERING SHEET AIR BARRIER

A. Modified Bituminous Sheet

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Carlisle Coatings & Waterproofing; CCW-705.
   b. Grace, W. R. & Co.; Perm-A-Barrier.
   c. Henry Company; BlueskinVP160

2. Physical and Performance Properties:

   a. Membrane Air Permeance: Not to exceed **0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa)** pressure difference; ASTM E 2178.
   b. Vapor Permeance: **0.05 perms (2.9 ng/Pa x s x sq. m)**; ASTM E 96, Water Method.

1.5 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid primer recommended for substrate by manufacturer of air barrier material.

C. Counterflashing Strip: Modified bituminous 40-mil- (1.0-mm-) thick, self-adhering sheet consisting of 32 mils (0.8 mm) of rubberized asphalt laminated to an 8-mil- (0.2-mm-) thick, crosslaminated polyethylene film with release liner backing.

D. Butyl Strip: Vapor-retarding, 30- to 40-mil- (0.76- to 1.0-mm-) thick, self adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive, with release liner backing.

E. Termination Mastic: Cold fluid-applied elastomeric liquid; trowel grade.

F. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

G. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

H. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft. (24 to 32 kg/cu. m) density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

I. Modified Bituminous Transition Strip: Vapor-retarding, 40-mil- (1.0-mm-) thick, smooth-surfaced, self-adhering; consisting of 36 mils (0.9 mm) of rubberized asphalt laminated to a 4-mil- (0.1-mm-) thick polyethylene film with release liner backing.

END OF SECTION 072713

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

1.1 QUALITY ASSURANCE

A. Mockups of wall assembly for preconstruction testing.

B. All building exterior envelope air and moisture barrier components, including below-slab, foundation, exterior wall and roof, must be compatible and continuous.

1.2 PRECONSTRUCTION TESTING

A. Mockup testing for qualitative and quantitative air leakage by Owner's testing agency.

1.3 MATERIALS

A. VOC Content: 250 g/L or less.

B. Fluid-Applied, Vapor-Retarding Membrane: Synthetic polymer.

1. BASF Global: Enershield-HP (High Permeability).
2. Carlisle Coatings and Waterproofing (CCW): Barritech VP.
3. Grace Construction Products: Perm-A-Barrier VP.
4. Henry Company: Air Bloc® 31.
5. Prosoco Inc.: R-Guard Spray Wrap.
6. Tremco Commercial Sealants & Waterproofing: ExoAir™ 220 or 230.

1.4 AUXILIARY MATERIALS

A. Primer: Liquid, waterborne.

B. Butyl Strip: 30 to 40 mils thick; self-adhering.

C. Adhesive-Coated Transition Strip: Vapor permeable, 17 mils thick; self-adhering.

D. Elastomeric Flashing Sheet: 50- to 65-mil- thick, cured sheet neoprene.

E. Preformed Silicone-Sealant Extrusion: Low-modulus silicone.

F. Joint Sealant: Single-component, neutral-curing silicone.

1.5 INSTALLATION

A. Vapor-Retarding Membrane: 40-mil dry film thickness.

B. Coordinate air barrier installation with other elements of wall assembly so that air barrier exposure to ultraviolet light is within acceptable limits.

1.6 FIELD QUALITY CONTROL

A. Testing and Inspecting: By Owner-engaged agency, qualitative and quantitative tests, at Owner's discretion.

END OF SECTION 072726

SECTION 074243 – COMPOSITE METAL WALL SYSTEMS

PART 1 - GENERAL

0.1 SUMMARY

. This Section includes aluminum composite material fabricated from materials with recycled content into panels and related trim.

1. Dry system with seams routed and returned at welded panel edges.
2. Extruded aluminum panel support system.
3. Flashings and accessories.
4. Coping caps incorporated into system.

0.2 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Provide wall system that complies with air infiltration and water penetration performance requirements indicated without the reliance of a secondary backup membrane.

B. Bond Integrity: Provide wall system with no loss of bond strength or delamination when tested in accordance with the following:

1. Bond Strength: 861 psi (5941 kPa) minimum in accordance with ASTM C 297-88.
2. Peel Strength: 22.5 lb/in. (0.4 kg/cm) minimum in accordance with ASTM D 1781-76, or 20 lb/in. (0.35 kg/cm) minimum in accordance with ASTM D 903.
3. In addition, the panels should remain intact with no decrease in bond strength after 8 hours in 212 deg F. (100 deg. C) water, and 21 consecutive days immersed in 70 deg. F. (20 deg. C) water.

C. Structural Performance of Wall System: Provide wall system capable of withstanding the effects of all loads integral to itself and elements attached to it or supported by it, including all gravity loads in combination with the following horizontal loads. Member design and connections shall be based on the worst combination of gravity and any single horizontal load.

1. Structural Performance Testing: Wall system shall be tested in accordance with ASTM E 330-84 at design pressure. Deflection of horizontal perimeter framing members normal to the plane of the wall between supports shall not exceed L/240 of the span length or 1/2-inch, whichever is less. After initial test, test at 150 percent of design pressure. No permanent deformation exceeding L/1000 or failure to structural members allowed.
2. Wind Loads: As required by IBC for Wind Design, but not less than that indicated by the General Structural Notes, applied perpendicular to the face of the wall panel, acting inward or outward.
3. Seismic Loads: Loads required by IBC, (both perpendicular to and parallel with the plane of the wall, but not simultaneously).

D. Thermal Movements: Provide wall system that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing displacement of panels, opening of joints, overstressing of components, failure of joint sealants and connections, and other detrimental effects. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

0.3 WARRANTY

B. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

C. Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal wall panels within the specified warranty period and agreeing to repair finish or replace wall panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

D. Finish Warranty Period: 20 years from date of Substantial Completion.

1.9 ALUMINUM WALL SYSTEM FABRICATORS

A. Manufacturer: Subject to compliance with requirements, provide one of the following wall panels products:

1. Composite Aluminum Wall Panel Systems:

a. Alcoa Inc.; Reynobond.
b. Allied Metal, Estolga.
c. CENTRIA Architectural Systems; Formabond Wall System.
d. Elward Systems Corporation; Alucobond.
e. Una-Clad Inc.; Firestone.

1.10 ALUMINUM COMPOSITE MATERIAL

A. Composite Aluminum Material : Aluminum alloy face sheets applied under tension to both sides of an extruded, fire rated, thermoplastic core in a continuous process with no glues or adhesives between the materials.

1. Total Composite Thickness: 4 mm (0.157 inch) minimum.
2. Aluminum Face Sheets: 0.0197-inch (0.50 mm) thick aluminum type 3003 or 3105-H25 alloy for coil coated sheet.

1.11 WALL SYSTEM MOUNTING MATERIALS AND ACCESSORIES

A. Aluminum: Alloy and temper recommended by wall system fabricator and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:

2. Aluminum Sheet Prepainted with Coil Coating: Aluminum sheet complying with ASTM B 209 (ASTM B 209M) for alclad alloy 3003, 3004, or 3105-H25 with temper as required to suit forming operations, prepainted by the coil-coating process

3. Extruded Aluminum: ASTM B 221 (ASTM B 221M), alloy 6063-T52, with a minimum thickness of 0.080 inch (2.0 mm) for primary legs of extrusions.

a. Finish: Mill finish where not exposed to view in completed Work, black finish where exposed to view in joints.

B. Flashing: 0.060 inch (1.5 mm) thick aluminum, finished to match wall system.

1.12 ALUMINUM FINISHES

A. High-Performance Organic Coating Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

3. Fluoropolymer 2 or 3-Coat Coating System: Coil-coated Kynar 500 or Hylar 5000, thermocured system composed of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluorocarbon topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight; complying with AAMA 605.2-92 and the following:

1.13 PANEL WALL SYSTEM FABRICATION

A. General: Fabricate rout and return rainscreen dry-joint aluminum composite material wall system with all components and accessories as required to fulfill design intent and indicated performance requirements. Fabricate wall system and accessories at the shop to greatest extent possible.

B. Wall System: 1.5 to 2-inch nominal thickness system composed of an aluminum composite material surface mounted on aluminum extrusion shapes.

1. Form aluminum composite material with routed and returned edges forming a pan-type panel assembly anchored sealants into custom mounting extrusions forming rout and return joint with edges of composite panels and aluminum plate protected within the continuous joint pocket.
2. Fabricate wall system joints with nominal 3/8-inch wide reveals.
3. Provide continuous extruded aluminum mounting and indexing extrusions mechanically fastened to the aluminum composite material panel.

C. Fabricate wall system components to allow for field adjustment and thermal movement.

D. Square and trim edges of sheet with no displacement of aluminum sheets or protrusion of core material.

E. Form panel lines, breaks, and angles to be sharp and true, with surfaces that are free from warp or buckle.

F. Fabricate panel surface with grain pattern of finish running in same direction throughout wall system.

G. Where required for structural performance, shop apply extruded aluminum stiffeners with structural silicone adhesive to the back of the composite panels and aluminum plate panels to maintain flatness of the panel. Attach stiffeners in a manner that will not interfere with or restrain free differential thermal movement of the panel.

H. Fabricate curved panels in factory with extrusions rolled to match curve of panel.

I. Miscellaneous Shapes: Where composite panels cannot be formed to the required shape or configuration indicated, provide extruded or sheet aluminum shapes formed to the required shape or configuration and finished to match the composite panel. Fasten miscellaneous shapes to mounting extrusions by same method as panels to conform with performance requirements.

END OF SECTION 074243

SECTION 075419 – SINGLE PLY PVC MEMBRANE ROOFING

1.1 SUMMARY

A. Fully adhered, single ply thermoplastic (PVC) membrane roofing system installed over cover board Air Barrier and Substrate Board for a complete water-tight system.

B. SRI index of 78 or greater.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
2. Product Data for Credit IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
3. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealant**s** used inside the weatherproofing system, documentation indicating that they comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: The roofing material manufacturer shall have a minimum of five similar installations on projects within a 100-mile radius. These applications must still be performing without any signs of aging, delamination, degradation, etc., or other characteristics of premature failure. A list of reference projects showing dates of application, address, size, system used, and contact individual and phone number shall be submitted.

B. Installer Qualifications: The roofing system shall be applied only by an installer trained and authorized by the roofing material/system manufacturer prior to bid. The installer must have not less than five years of previous installation experience on projects of similar size and similar application using the indicated product. All work pertaining to the installation of the single ply PVC membrane roofing system, roof installation system and flashing shall only be completed by installation personnel trained and authorized by the roofing system manufacturer in those procedures.

1.5 WARRANTY

A. Manufacturer’s Warranty: The CONTRACTOR shall submit executed copy of single-ply membrane manufacturer's "Limited Service Warranty" agreement including flashing endorsement, signed by an authorized representative of manufacturer. The CONTRACTOR

shall provide form that was published with product literature as of date of Contract Documents. Upon successful completion of the WORK to the roofing system inspector's satisfaction, the manufacturer's 20 yr Full System Warranty shall be issued. Warranty shall include all items supplied by the roofing material manufacturer including the rigid roof insulation. Warranty shall be a "No Dollar Limit" warranty and shall not be pro-rated. The warranty shall have no exclusions for ponding water.

1. Warranty Period: 30 years from the date of Substantial Completion.

B. Installer/Roofing Contractor Warranty: The installer shall supply the OWNER with a separate 5 year workmanship warranty. In the event any WORK related to roofing, flashing, or metal WORK is found to be defective or otherwise not in accordance with the contract documents within the installer warranty term, the installer shall repair that defect at no cost to the OWNER for a period of five years after OWNER acceptance. The installer's obligation shall be directly to the OWNER, and a copy shall be sent to the roofing system manufacturer.

C. Both Manufacturer's and Installer's warranties shall state that warranty is for a 60 mph wind speed.

D. The OWNER will notify both the roofing system manufacturer and the installer of any leaks as they occur during the time period when both warranties are in effect.

E. The above warranties will not deprive the OWNER of other rights the OWNER may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the CONTRACTOR.

1.6 MEMBRANE SYSTEM MANUFACTURERS

A. Membrane must be manufactured by the company supplying the warranty (no private labeling) with a minimum successful track record of 20 years.

1.7 MEMBRANE

A General: Single-ply membrane shall be a reinforced vinyl membrane for fully adhered applications.

1. Classification: PVC Vinyl membrane, Grade 1 formulated for fully adhered installation.

2. thickness:

   a. 60 mils (.060") mils minimum with 30 mils above reinforcement.

3. Exposed Face Color:

   a. Energy Star White.

1.8 SUBSTRATE BOARDS

B. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, or ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate,

1.9 VAPOR RETARDER

C. Self Adhesive with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).

1.10 INSULATING MATERIALS

A. Polyisocyanurate Board Roof Insulation: Roof insulation shall be rigid, cellular, thermal insulation with polyisocyanurate closed-cell foam core and manufacturer's standard facing laminated to both sides; complying with ASTM C1289, Type II, Class I, Grade 2 (20 psi) , or Type III, coated glass facer, Class I.

1. Tapered boards shall be provided where slope is not provided by roof structure and where necessary for sloping to drain. Board shall be fabricated with taper of 1/4 inch per foot, required slope. EPS is not permitted.

2. Crickets, saddles, washbacks, etc. shall have a finished slope of ½-inch per foot.

3. Insulation shall be minimum 1-1/2-inch thickness within 1-foot of roof drains and roof overflow drains.

4. Where details indicate structure is sloped, thermal insulation shall be of consistent thickness, minimum 5 inch thickness (two layers), with minimum R-value of not less than 30.

5. Insulation shall be approved in writing by the insulation manufacturer for the intended application, and for use with single-ply materials. Insulation shall be installed in two layers not to exceed 2.7” per layer.

6. Insulation shall be accepted by the roofing system manufacturer as compatible with the single-ply PVC membrane and adhesives.

C Insulation shall be supplied and warranted by the roofing material manufacturer for the full term of the roofing system warranty.

1.9 COVER BOARDS

A. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch (16 mm)] thick.

1.10 INSULATION ATTACHMENT

A. Fasteners and plates shall meet Factory Mutual Standard 4470 for corrosion resistance

and wind uplift, or an adhesive method that will meet Factory Mutual I-90 standards and is compatible with roofing system FOR FIRST LAYER

B Low rise foam adhesive for second (upper) layer insulation

1.11 ACCESSORIES

A. Membrane Adhesive: Solvent/Water-based adhesive for bonding single-ply membranes to substrates shall be approved by the system manufacturer.

B. Flashing Membrane Adhesive: The adhesive for bonding flashing membrane to vertical flashing shall be solvent/water-based adhesive. Substrate must be compatible, clean, dry, and solvent-resistant.

C. Walkway Protection Mat: Crossgrip membrane with surface embossment shall be used as a protection layer from rooftop traffic. Pad system shall be no less than 32 inches wide. Mat shall be located as shown on the Drawings.

1.12 RELATED MATERIALS

A. Wood Nailers: Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as indicated. Thickness of nailers must match the insulation thickness in order for a smooth transition.

1. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated), #2 quality or better lumber. Creosote or asphaltic-treated lumber is not acceptable.

2. Wood nailers shall conform to Factory Mutual's Loss Prevention Data 1-49.

3. All wood shall have a moisture content no higher than 19 percent by weight on a dry weight basis.

END OF SECTION

WARRANTY FOR SINGLE PLY ROOFING

WHERE AS,_____(manufacture name), a corporation whose address is, _____ hereinafter called the Manufacturer, has manufactured and sold and caused to have applied, pursuant to the specifications and inspection, the necessary roofing materials to construct a PVC, TPO, EPDM or other single ply roof of approximately _____square feet and associated roof flashing of approximately _____ linear feet on the building described below:

OWNER: STATE OF UTAH

Owner:State of Utah

DFCM Project Number:_____

Building Name:_____

Location:_____

Date of Acceptance of Roofing:_____

Manufacturer Address:_____

Manufacturer's Warranty No:_____

Phone Number for Warranty Services:_____

Roofing Contractor Name:_____

Roofing Contractor Address:_____

AND WHEREAS, by careful examination of said roof by the Manufacturer's representative, it has been determined that roofing materials have been applied in conformance with Manufacturer's specifications.

AND WHEREAS, Manufacturer represents and wishes to warranty, subject to the limits stated herein, that its roofing when so applied is effectively watertight for a period of thirty (30) years despite normal wear and tear by the elements, as well as guaranteeing it against defects in workmanship or materials.

NOT withstanding any other provision herein, this warranty shall not cover damages related to winds in excess of _____ miles per hour

NOW THEREFORE, said Manufacturer warranties to the said Owner that, as set forth below, during a period of thirty (30) years from the date of acceptance of said single-ply roofing described above, Manufacturer will at its own expense, make or cause to be made, any repairs that may be necessary, as a result of defects in workmanship or materials supplied by the Manufacturer which results in leaks or of normal wear and tear by the elements which results in leaks, and will maintain said roof in water tight condition free from all leaks arising from such causes. For purposes of this warranty, damage to the roof caused by any unusual natural phenomena shall not be deemed to be "normal wear and tear by the elements".

INCLUSIONS: This Warranty does cover, and Manufacturer shall be liable for the following:

1. Roofing membrane, membrane flashings, metal flashings, mechanical fastening system, anchors, adhesives, seaming materials, slip sheets, fabrics, insulations, under payments, and accessories furnished by the Manufacturer as incorporated into the roof membrane system.

2. Vapor barriers, insulations and / or materials furnished by the Manufacturer or approved to be incorporated into the roof membrane assembly and such damage as may result from failure of these materials.

3. Repair of splits, breaks, cracks, and seam failures in membrane system.

4. Leaks from failure in material or workmanship.

EXCLUSIONS: This Warranty does not cover, and Manufacturer shall not be liable for the following:

1. Metal work, including metal counter flashings, not a part of the roof membrane system and such damage as may result from application of these materials;

2. Any damage to the roof caused by structural defect in, or failure of, the building or defects in, or failure of, any structural roof deck, or other sheathing materials, used as the base over which the roof and roof insulation is applied;

3. Roof damage from special chemical conditions not disclosed to Manufacturer;

4. Any damage to the building or contents thereof, except replacement of damaged roof insulation and vapor barrier as noted under "INCLUSION" above;

5. Damage due to unauthorized alterations to roofing system.

6. Damage to the roof due to mechanical abrasion or abuse not caused by the Manufacturer.

7. Damage or failure directly caused by the re-use of existing material. (re-roof)

8. Reasonable care and maintenance will be the responsibility of the owner.

INSPECTION AND REPAIR: During the term of this Warranty, Manufacturer, its agents or employees, shall have free access to the roof during regular business hours. Upon verbal notice by Owner to Manufacturer within four days of the discovery of any leaks in the roofing system, or need of repair of roof, the Manufacturer shall have ten (10) days to inspect the roof. Following such inspection:

1. Manufacturer, at its own expense shall make such repairs as are required by this warranty.

2. In case owner or his agent has verbally notified Manufacturer that repairs are required and such repairs are not covered by the Warranty (including repairs required by owner's alteration, extension or addition to the roof) Manufacture, after having obtained Owner's consent thereto, in writing, shall make or cause to be made, such repairs at Owner's expense in accordance with specifications and procedures as established by Manufacturer and this warranty shall thereupon remain in effect for the un-expired portion of its original term. If Owner fails to so consent or if repairs are made by one other than the Manufacturer's authorized designee, this Warranty with respect to such area shall be automatically terminated.

3. In the event the (1) Owner notifies Manufacturer and has confirmed the need of repair of roof and (2) Manufacturer is unable to promptly inspect and repair same, and (3) an emergency condition exists which requires prompt repair in order to avoid substantial damage to owner, then owner may make such temporary repairs as may be essential and any such action shall not be a breach of the provision of this Warranty. Owner will bear emergency repair expenses.

INSPECTION SERVICE: Manufacturer agrees to re-inspect the completed roof not earlier than 18 nor later than 24 months after completion of the roofing, and if it is determined that there are defects in the roofing, then Manufacturer shall make, or cause to be made at its own expense, such repairs as are necessary to remedy said defects within the scope of its responsibility under the terms of this Warranty.

IN WITNESS WHEREOF, Manufacturer has caused this instrument to be signed and sealed by its duly authorized officer this day of _____.

BY: _____

TITLE: _____

CORPORATION: _____

SEAL:

Division of Facilities Construction and Management
Risk I.D. _____

CONTRACTOR ROOFING WARRANTY

WHEREAS: _____

Of (Address): _____ (Phone): _____

Herein called the "Roofing Contractor," has performed roofing and associated ("Work") on the following project:

Owner: State of Utah

Agency: _____

Name of Building: _____

DFCM Project Number: _____

Address: _____

Description of Work: _____

Date of Acceptance: _____

Warranty Period: 5 Years

Date of Expiration: _____

AND WHEREAS Roofing Contractor has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said Work against leaks and faulty or defective materials and workmanship for said designated Warranty Period.

NOW THEREFORE Roofing Contractor hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period, Roofing Contractor will at his own cost and expense, promptly make or cause to be made such repairs to or replacements of said Work as are necessary to correct faulty and defective Work, and as are necessary to maintain said Work in watertight condition. In addition to making the Work watertight, the Roofing Contractor shall promptly remove and/or repair blisters, ridges, flashings, splits and other irregularities which in the opinion of the Roofing Manufacture's technical representative do not conform to acceptable roofing practices and conditions. These repairs shall be made promptly and to the satisfaction of the Roofing Manufacturer's technical representative. Upon notice of Owner to Roofing Contractor, Contractor agrees to make the necessary leak repairs according to manufacturer's specifications within five business days from written notice given by DFCM.

This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to Work and other parts of the building, and to building contents, not caused by the act or negligence of Contractor and caused by: a) lightning, windstorm in excess of manufacturer's specifications; b) fire; c) failure of roofing system substrate including cracking settlement, excessive deflection, deterioration, and decomposition; d) faulty construction of parapet walls, copings, chimneys, skylights, vents, and equipment supports, not part of contractors work and e) activity on roofing by others including construction contractors, maintenance personnel, other persons, and animals whether authorized or unauthorized by Owner, but only to the extent any of the above exclusions are not due to the failure of the Roofing Contractor to meet all required specifications and the customary practices of the performing the work. When Work has been damaged by any of the foregoing causes, Warranty shall be suspended until such damage has been repaired by Roofing Contractor, and until cost and expense thereof has been paid by DFCM or by another responsible party so designated.

2. The Roofing Contractor is responsible for damage to Work covered by this Warranty, and is liable for consequential damages to building or building contents, resulting from leaks or faults or defects of Work that are related to Roofing Contractor's failure to meet.

3. During Warranty Period, if Owner allows alteration of Work by anyone other than Roofing Contractor or anyone not authorized by Roofing Contractor, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void upon date of said alterations, but only to extent said alterations affect Work covered by this Warranty. If Owner engages Roofing Contractor to perform said alterations, Warranty shall not become null and void, unless Roofing Contractor, prior to proceeding with said Work, shall reasonably claim that said alterations would damage or deteriorate Work, thereby reasonably justifying a limitation or termination of this Warranty.

4. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void upon date of said change, but only to extent said change affects Work covered by this Warranty.

5. The DFCM shall notify Roofing Contractor of observed, known or suspected leaks, defect or deterioration, and shall afford reasonable opportunity for Roofing Contractor to inspect Work, and to examine evidence of such leaks, defects or deterioration.

This Warranty is recognized to be the only Warranty of Roofing Contractor on said Work, and is in addition to the Roofing Warranty furnished by the Roofing Manufacturer, and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to it in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Contractor of responsibility for performance of original Work in accordance with requirements of the Contract Documents, regardless of whether Contract was a contract directly with DFCM or a subcontract with DFCM's General Contractor.

Any modification to the terms and conditions of this document will be submitted to the Attorney General's Office for investigation/prosecution.

IN WITNESS THEREOF, this instrument has been dully executed this

Day of , 20

Signed by Roofing Contractor by:

Roofing Contractor

Business Address

Signature & Printed Name

Title

Cosigned by General Contractor by:

General Contractor

Business Address

Signature & Printed Name

Title

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets **with counterflashing**.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1.5 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: **20** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with **NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual"** requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. SPRI Wind Design Standard: Manufacture and install **copings roof edge flashings** tested according to SPRI ES-1 and capable of resisting the following design pressure:

E. Recycled Content of Copper-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **40** percent.

F. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **25** percent.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
   1. Prepatinated Copper-Sheet Finish: TBD

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

   1. As-Milled Finish:
   2. Alclad Finish:
   3. Factory Prime Coating:
   4. Clear Anodic Finish, Coil Coated
   5. Exposed Coil-Coated Finish:

D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed;

E. Metallic-Coated Steel Sheet: Provide **zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275)**; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

   1. Surface: **TBD**

2. Exposed Coil-Coated Finish:

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F (111 deg C); and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal **or manufactured item** unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal **or manufactured item**.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

   a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
   b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
   c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
5. Fasteners for Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:

1. For Copper: ASTM B 32,
2. For Stainless Steel: ASTM B 32, with acid flux of type recommended by stainless-steel sheet manufacturer.
3. For Zinc-Coated (Galvanized) Steel: ASTM B 32.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric [**polyurethane**] [**polysulfide**] [**silicone**] polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge flashings.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.

1.2 PERFORMANCE REQUIREMENTS

A. FM Approvals' Listing: Manufacture and install **copings and roof-edge flashings** that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, **Class 1-120**. Identify materials with FM Approvals' markings.

B. SPRI Wind Design Standard: Manufacture and install **copings and roof-edge flashings** tested according to SPRI ES-1 and capable of resisting the required design pressures:

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified.

1.4 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at **Project site**.

1.5 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within **20** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

A. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

2.2 CONCEALED METALS

A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

C. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.

D. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.

3. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

D. Butyl Sealant: ASTM C 1311, 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 emulsion complying with ASTM D 1187.

F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

G. Solder for Copper: ASTM B 32, lead-free solder.

2.5 COPINGS

A. Copings: Manufactured coping system consisting of formed-metal coping cap, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.

2.6 ROOF-EDGE FLASHINGS

A. Canted Roof-Edge: Manufactured, two-piece, roof-edge fascia consisting of metal fascia cover and a continuous formed galvanized-steel sheet cant, 0.028 inch (0.71 mm) thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.

B. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover and a continuous formed- or extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.

C. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop with a horizontal flange and vertical leg, fascia, and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.

2.7 ROOF-EDGE DRAINAGE SYSTEMS

A. Gutters: Manufactured in uniform section lengths, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

B. Downspouts: Complete with elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

C. Parapet Scuppers: Manufactured with closure flange trim to exterior, wall flanges to interior, and base extending beyond cant or tapered strip into field of roof

D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout.

2.8 REGLETS AND COUNTERFLASHINGS

A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings designed to snap into and compress against base flashings with joints lapped, from the following exposed metal:

C. Accessories:

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Roof hatches.
4. Hatch-type heat and smoke vents.
5. Drop-out type heat and smoke vents

1.2 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within **10** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

D. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

E. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.

F. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Acrylic Glazing: ASTM D 4802, thermoformable, monolithic sheet, manufacturer's standard, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).

C. Polycarbonate Glazing: Thermoformable, monolithic polycarbonate sheets manufactured by extrusion process, burglar-resistance rated according to UL 972 with an average impact strength of **12 to 16 ft-lbf/in.** of width when tested according to ASTM D 256, Method A (Izod).

D. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

E. Security Grilles: **3/4-inch** ASTM A 1011/A 1011M steel bars spaced **6 inches** o.c. in one direction and **12 inches** o.c. in the other; factory finished with manufacturer's or fabricator's standard, universal shop primer compatible with substrate and field-applied finish paint system indicated.

F. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide non-removable fastener heads to exterior exposed fasteners.

G. Sealants: As recommended by roof accessory manufacturer for installation indicated.

2.3 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units **with integral spring-type vibration isolators and** capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, and integrally formed deck-mounting flange at perimeter bottom.

B. Material: **Zinc-coated (galvanized), aluminum-zinc alloy-coated** steel sheet

C. Material: Aluminum sheet

D. Material: Stainless-steel sheet

2.4 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, and integrally formed deck-mounting flange at perimeter bottom.

A. Material: **Zinc-coated (galvanized), aluminum-zinc alloy-coated** steel sheet

B. Material: Aluminum sheet

C. Material: Stainless-steel sheet

2.5 ROOF HATCH

A. Roof Hatches: Metal roof-hatch units with lids and insulated **double**-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, **stepped integral metal cant raised the thickness of roof insulation,** and integrally formed deck-mounting flange at perimeter bottom.

B. Type and Size: Single-leaf lid,

C. Hatch Material: **Zinc-coated (galvanized) Aluminum-zinc alloy-coated** steel sheet,

D. Hatch Material: Aluminum sheet

E. Hatch Material: Stainless-steel sheet

F. Hardware: Galvanized-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.

G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder. Post locks in place on full extension; release mechanism returns post to closed position.

2.6 HEAT AND SMOKE VENTS

A. Hatch-Type Heat and Smoke Vents: Manufacturer's standard, with **double**-walled insulated curbs, welded or mechanically fastened and sealed corner joints, integral condensation gutter, and cap flashing. Fabricate with insulated double-walled lid and continuous weathertight perimeter lid gaskets, and equip with automatic self-lifting mechanisms and UL-listed.

1. Type and Size: Single-leaf lid, Revise one or more options in first subparagraph below if required by authorities having jurisdiction or for insurance purposes. Compliance with UL 793 is requirement of IBC.

2. Heat and Smoke Vent Standard: Provide units that have been tested and **listed to comply with UL 793 and are FM Approved**.
3. Curb, Framing, and Lid Material: **Zinc-coated (galvanized) Aluminum-zinc alloy-coated** steel sheet

4. Curb, Framing, and Lid Material: Aluminum sheet,

5. Curb, Framing, and Lid Material: Stainless-steel sheet,
6. Hardware: Manufacturer's standard, corrosion resistant or hot-dip galvanized; with hinges, hold-open devices, and independent manual-release devices for **outside** operation of lids.

B. Dropout-Type Heat and Smoke Vents: Manufacturer's standard, gravity operated and automatic; with **double**-walled insulated curbs and frame, welded or mechanically fastened and sealed corner joints, integral condensation gutter, cap flashing, and heat-sensitive dome glazing that will deform and drop out of vent opening according to heat and smoke vent standard indicated.

1. Loads: Minimum [**40-lbf/sq. ft. (1.9-kPa)**] <**Insert value**> external live load and [**30-lbf/sq. ft. (1.4-kPa)**] <**Insert value**> internal uplift load.

a. Dome Glazing: Minimum [**40-lbf/sq. ft. (1.9-kPa)**] <**Insert value**> external live load and [**20-lbf/sq. ft. (0.95-kPa)**] <**Insert value**> internal uplift load.

2. Heat and Smoke Vent Standard: Provide units that have been tested and **listed to comply with UL 793 and are FM Approved**.
3. Curb and Framing Material: **Zinc-coated (galvanized) Aluminum-zinc alloy-coated** steel sheet,

4. Curb and Framing Material: Aluminum sheet,

5. Curb and Framing Material: Stainless-steel sheet,

6. Dome Glazing: **Double polycarbonate** glazing of thickness capable of resisting indicated loads.

7. Hardware: Manufacturer's standard, corrosion resistant or hot-dip galvanized; with hinges, hold-open devices, and independent manual-release devices for **outside** operation of lids.

END OF SECTION 077200

SECTION 078100 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sprayed fire-resistive materials (SFRM).

B. Related Requirements:

1. Section 078123 "Intumescent Fireproofing" for mastic and intumescent fire-resistive coatings.
2. Section 099646 "Intumescent Painting" for intumescent paints that are fire retarding but not fire resistive.

1.2 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at **Project site**.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit EQ 4.2: For paints and coatings, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For paints and coatings used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Fire-Resistance Design: Indicated on Drawings, tested according to **ASTM E 119 or UL 263** by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

C. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction.

1. Flat Paints and Coatings: 50 g/L.
2. Non-flat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.

D. Low-Emitting Materials: Fireproofing used within the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. SFRM: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design.

1. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
2. Bond Strength: Minimum [**150-lbf/sq. ft. (7.18-kPa)**] [**430-lbf/sq. ft. (20.59-kPa)**] [**1000-lbf/sq. ft. (47.88-kPa)**] cohesive and adhesive strength based on field testing according to ASTM E 736.
3. Density: Not less than [**15 lb/cu. ft. (240 kg/cu. m) and**] [**22 lb/cu. ft. (350 kg/cu. m) and**] [**40 lb/cu. ft. (640 kg/cu. m) and**] as specified in the approved fire-resistance design, according to ASTM E 605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
5. Combustion Characteristics: ASTM E 136.
6. Surface-Burning Characteristics: Flame-spread and smoke-developed indexes of 10 or less according to ASTM E 84.
7. Compressive Strength: Minimum **10 lbf/sq. in. (68.9 kPa)** according to ASTM E 761.
8. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.

9. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
11. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours according to ASTM E 859.
12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G 21 or rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer.

C. Bonding Agent: Product approved by fireproofing manufacturer

D. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

END OF SECTION 078100

SECTION 078100 - SPRAYED FIRE-RESISTIVE MATERIALS

1.1 SUMMARY

A. This Section includes the following:

1. Concealed sprayed fire-resistive materials.

1.2 SUBMITTALS

A. Product Data: For each fire-resistive product specified.

B. LEED Submittal:

1. Product Data for Credit MR 4.1: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

   a. Include statement indicating costs for each product having recycled content.

2. Product Certificates for Credit MR 5.1 and 5.2: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.3 CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

A. General: For concealed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated in this Article for material composition and physical properties representative of installed products.

B. Material Composition: as follows:

1. Cementitious sprayed fire-resistive material consisting of factory-mixed, dry formulation of gypsum or portland cement binders and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.

C. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property listed as follows:

1. Dry Density: 15 lb/cu. ft. (240 kg/cu. m) for average and individual densities regardless of density indicated in referenced fire-resistive design, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination."
2. Thickness: Provide minimum average thickness required for fire-resistive design indicated according to the following criteria, but not less than 0.375 inch (9 mm), per ASTM E 605.

   a. Where the referenced fire-resistive design lists a thickness of 1 inch (25 mm) or greater, the minimum allowable individual thickness of sprayed fire-resistive material is the design thickness minus 0.25 inch (6 mm).

b. Where the referenced fire-resistive design lists a thickness of less than 1 inch (25 mm) but more than 0.375 inch (9 mm), the minimum allowable individual thickness of sprayed fire-resistive material is the greater of 0.375 inch (9 mm) or 75 percent of the design thickness.
c. No reduction in average thickness is permitted for those fire-resistive designs whose fire-resistance ratings were established at densities of less than 15 lb/cu. ft. (240 kg/cu. m).

3. Bond Strength: 150 lbf/sq. ft. (7.2 kPa) per ASTM E 736 under the following conditions:

a. Field test sprayed fire-resistive material that is applied to flanges of wide-flange structural-steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
b. If surfaces of structural steel receiving sprayed fire-resistive material are primed or otherwise painted, perform series of bond tests specified in UL's "Fire Resistance Directory" for coating materials.
c. Minimum thickness of sprayed fire-resistive material tested in laboratory shall be 0.75 inch (19 mm).

4. Compressive Strength: 5.21 lbf/sq. in. (35.9 kPa) as determined in the laboratory per ASTM E 761. Minimum thickness of sprayed fire-resistive material tested shall be 0.75 inch (19 mm) and minimum dry density shall be as specified, but not less than 15 lb/cu. ft. (240 kg/cu. m).
5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
6. Deflection: No cracking, spalling, delamination, or the like per ASTM E 759.
7. Effect of Impact on Bonding: No cracking, spalling, delamination, or the like per ASTM E 760.
8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.27 g/sq. m) in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of sprayed fire-resistive material is 0.75 inch (19 mm), maximum dry density is 15 lb/cu. ft. (240 kg/cu. m), test specimens are not prepurged by mechanically induced air velocities, and tests are terminated after 24 hours.

D. Available Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cementitious Sprayed Fire-Resistive Material:
a. Pyrolite 15; Carboline Co., Fireproofing Products Div.
b. Monokote Type MK-6; W.R. Grace & Co.--Conn., Construction Products Div.
c. Cafco 300; Isolatek International Corp., Cafco Products.

END OF SECTION 078100

SECTION 078200 - BOARD FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Calcium silicate board fire protection.
2. Mineral-fiber board fire protection.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Structural framing plans indicating the following:

1. Locations and types of surface preparations required before applying board fire protection.
2. Extent of board fire protection for each construction and fire-resistance rating.

a. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates.

B. Research/Evaluation Reports.

1.4 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Indicated by design designations from **UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency** acceptable to authorities having jurisdiction, for board fireproofing serving as direct-applied protection tested per ASTM E 119.

B. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

PART 2 - PRODUCTS

2.1 BOARD FIRE PROTECTION

A. Calcium Silicate Board: Rigid board containing no asbestos and consisting primarily of lime, silica, inert fillers, and cellulosic reinforcing fibers; of thickness required to produce fire-resistance rating indicated; with flame-spread and smoke-developed indexes of zero per ASTM E 84; passing ASTM E 136 for combustion characteristics.

B. Mineral-Fiber Board: **Fiberglass mat-faced** rigid board produced by combining slag-wool-/rock-wool fibers with thermosetting resin binders passing ASTM E 136 for combustion characteristics; of thickness required to produce fire-resistance rating indicated.

1. Maximum Density: **10 lb/cu. ft. (160 kg/cu. M)** per ASTM C 612.
2. Surface-Burning Characteristics: Flame-spread and smoke-developed indexes of **5 zero**, per ASTM E 84.

2.2 ACCESSORIES

A. Anchorage Accessories: Provide manufacturer's standard board anchorage components complying with related design of UL or of another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Joint Treatment and Finishing Materials: For exposed calcium silicate board applications, provide joint treatment tape and joint compounds recommended in writing by board manufacturer for finishing surfaces.

END OF SECTION 078200

SECTION 078413 - THROUGH-PENETRATION FIRESTOP SYSTEMS

1.1 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:

1. Walls and partitions.
2. Floors
3. Smoke barriers.

1.2 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.

B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

1. Penetrations located outside wall cavities.
2. Penetrations located in construction containing fire-protection-rated openings.
3. Penetrating items larger than 4-inch- (100-mm-) diameter nominal pipe or 16 sq. in. (100 sq. cm) in overall cross-sectional area.

D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.2 SUBMITTALS

A. LEED Submittal:

1. Product Data for Credit EQ 4.1/4.2 : For penetration firestopping, including printed statement of VOC content and chemical components.

1.3 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

    a. Slag-/rock-wool-fiber insulation.
    b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    c. Fire-rated form board.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtain-wall/floor intersections.

1.2 ACTION SUBMITTALS

A. LEED Submittals:

1. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

2. Credit IEQ 4.2: Product data for paints and coatings applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

1. Joints include those installed in or between fire-resistance-rated walls and floor or floor/ceiling assemblies.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.

C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide fire-resistive joint systems with rating determined by ASTM E 119 based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa) or ASTM E 2307.

1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

D. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials that are needed to install fill materials and to maintain ratings required. Use only

components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

E. Resistive joint systems complying with specified requirements.

END OF SECTION 078446

SECTION 079200 - JOINT SEALANTS

1.1 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:

B. This Section includes sealants for the following applications:

1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
   a. All joints created by new construction.

2. Exterior joints in the following horizontal traffic surfaces:
   a. Joints between paving and walks.

3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
   a. All joints created by new construction

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. LEED Submittal:

1. Product Data for Credit EQ 4.1: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.

2. Product Data for Credit MR 4.1: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

   a. Include statement indicating costs for each product having recycled content.

1.4 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

1.5 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920

B. Additional Movement Capability: provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719,

C. Stain-Test-Response Characteristics: nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

1.6 SOLVENT-RELEASE JOINT SEALANTS

A. Acrylic-Based Solvent-Release Joint-Sealant Standard: Comply with ASTM C 1311 for each product of this description indicated in the Solvent-Release Joint-Sealant Schedule at the end of Part 3.

B. Butyl-Rubber-Based Solvent-Release Joint-Sealant Standard: Comply with ASTM C 1085 for each product of this description indicated in the Solvent-Release Joint-Sealant Schedule at the end of Part 3.

1.7 PREFORMED JOINT SEALANTS

A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam, impregnated with a nondrying, water-repellent agent and faced with a color bellows facing. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated.

1.8 LATEX JOINT SEALANTS

A. Latex Sealant Standard: Comply with ASTM C 834

1.9 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: nonstaining latex sealant complying with ASTM C 834

1.10 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.

2. Type O: Open-cell material.
3. Type B: Bicellular material with a surface skin.
4. Type: Any material indicated above.

1.11 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

D. Low-Modulus Nonacid-Curing Silicone Sealant:

1. Type and Grade: S (single component) and NS (nonsag).
2. Class: 25.
3. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
7. Applications: Exterior joints and Control joints in exterior wall systems.

E. Neutral one part Medium modulus silicone Sealant:

1. Type and Grade: S (single component) and NS (nonsag).
2. Class: 25.
3. Additional Movement Capability: 25/50 percent movement
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
7. Applications: flashing set, perimeter of glazing to wall substrates.

F. Mildew-Resistant Silicone Sealant : Where joint sealants of this type are indicated, provide products formulated with fungicide that are intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes, and that comply with the following:

1. Type and Grade: S (single component) and NS (nonsag).
2. Class: 25.
3. Use Related to Exposure: NT (nontraffic).

4. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

5. Applications: Interior toilets at fixtures and expansion joints.

G. Pourable Silicone Sealant:

1. Type and Grade: S (single component) and P (pourable).
2. Class: 25.
3. Additional Movement Capability: 100 percent movement in extension and 50 percent in compression for a total of 150 percent movement
4. Uses Related to Joint Substrates: M and, as applicable to joint substrates indicated, O.
5. Applications: Concrete sidewalks, curbs and paving

H. Single-Component Nonsag Urethane Sealant - porous substrates requiring painting, concealed applications for flashing applications.

1. Type and Grade: S (single component) and NS (nonsag).
2. Class: 25.
3. Uses Related to Exposure: T (traffic) and NT (nontraffic).
4. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

1.12 SOLVENT-RELEASE JOINT-SEALANT SCHEDULE

A. Butyl-Rubber-Based Solvent-Release Sealant :

1. Applications: Bedding thresholds, concealed joints in flashing systems

1.13 LATEX JOINT-SEALANT SCHEDULE

A. Latex Sealant :

1. Applications: Interior joints in gypsum board applications

END OF SECTION 079200

SECTION 079500 – EXPANSION CONTROL

1.1 SUMMARY

A. Section Includes:

1. Expansion control systems.

1.2 SUBMITTALS

A. LEED Submittal:

1. Credits MR 4.1 and 4.2: For products having recycled content, manufacturer's documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

   a. Include statement indicating cost for each product containing steel.

2. Credit MR 5.1 and 5.2: Submit the locations of manufacturing and harvest, extraction or recovery for all products manufactured within 500 miles that also contain raw materials harvested, extracted or recovered within 500 miles. Submit distances in miles, as the crow flies, from the harvest/extraction/recovery site and from the manufacturing site to the Project.

   a. Submit cut sheet and/or letter from manufacturer verifying locations.
   b. Include statement indicating cost for each material and the fraction by weight that is considered regional.

3. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.
4. Credit IEQ 4.2: Product data for paints and coatings applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

1.3 JOINT SYSTEMS

A. General: Provide joint systems of design, basic profile, materials, and operation indicated. Provide units with the capability to accommodate joint widths indicated and variations in adjacent surfaces.

1. Furnish units in longest practicable lengths to minimize number of end joints. Provide hairline mitered corners where joint changes directions or abuts other materials.
2. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint systems.
3. Frames for Strip Seals: Designed with semiclosed cavity that provides a mechanical lock for seals of type indicated.
4. Public Area Seals: Non-slip seals designed for installation on treads and risers and to lie flat with adjacent surfaces, and complying with ADA guidelines for public areas.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide factory-fabricated architectural joint systems capable of withstanding the types of loads and of accommodating the kinds of movement, and the other functions for which they are designed including those specified below, without failure. Types of failure include those listed in Appendix X3 of ASTM E 1399.

1. Pedestrian Traffic Joints: Support pedestrian traffic across joint.
2. Exterior Joints: Maintain continuity of weather enclosure.
3. Joints in Fire-Resistance-Rated Assemblies: Maintain fire-resistance ratings of assemblies.
4. Joints in Smoke Barriers: Maintain integrity of smoke barrier.
5. Joints in Acoustically Rated Assemblies: Inhibit passage of airborne noise.
6. Other Joints: Where indicated, provide joint systems that prevent penetration of water, moisture, and other substances deleterious to building components or content.
7. Seismic Joints: Remain in place on exposure to seismic activity (movement).
8. Joints in Surfaces with Architectural Finishes: Serve as finished architectural joint closures.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Fire-Resistance Ratings: Where required, provide expansion control systems with fire barriers identical to those of systems tested for fire resistance per UL 2079 or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Hose Stream Test: Wall-to-wall and wall-to-ceiling systems shall be subjected to hose stream testing.

D. Seismic Performance: Expansion control systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
2. Component Importance Factor is 1.5.

1.5 EXPANSION JOINTS

A. Expansion Joint Cover, Anodized Aluminum, Angled:

B. Expansion Joint Cover, Anodized Aluminum, Flat:

C. Expansion Joint, Pre-Formed Cellular:

D. Expansion Joint, Pre-Formed Cellular, Fire-Rated:

E. 2-Hour Fire-Rated, Insulated, Expansion Joint:

END OF SECTION 079500

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

1.1 SUMMARY

A. Section includes hollow-metal work.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.3 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

E. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

F. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

G. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

H. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

I. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

J. Glazing: Section 088000 "Glazing."

1.4 INTERIOR DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.

2. Doors:

   a. Thickness: 1-3/4 inches (44.5 mm).
   b. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
   c. Edge Construction: Model 1, Full Flush.
   d. Core: Manufacturer's standard kraft-paper, honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral board, or vertical steel stiffener.

3. Frames:

   a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch (1.3 mm).
   b. Construction: Full profile welded, with mitered or coped corners.

4. Exposed Finish: Prime.

1.5 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

   a. Thickness: 1-3/4 inches (44.5 mm).
   b. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm), with minimum A40 (ZF120) coating.
   c. Edge Construction: Model 1, Full Flush.
   d. Core: Manufacturer's standard kraft-paper, honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral board, or vertical steel stiffener.

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) complying with 2012 IECC

4. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
   b. Construction: Full profile welded.

5. Exposed Finish: Prime.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.

   a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
   b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

3. Certificates for Credit MR 6 and Credit MR 7: Chain-of-custody certificates indicating that flush wood doors comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
4. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.

1.3 FLUSH WOOD DOORS

A. Certified Wood: Flush wood doors shall be certified as "FSC Pure" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."

B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

C. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.

D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.

E. Particleboard-Core Doors – 5 Ply:

1. Particleboard: ANSI A208.1, made with binder containing no urea-formaldehyde.
2. Blocking: Provide wood blocking in particleboard-core doors as follows:

a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have kick, mop, or armor plates.

3. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:

a. 5-inch (125-mm) top-rail blocking.
b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
d. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.

3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

1.4 LIGHT FRAMES AND LOUVERS

A. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.3 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Frame Anchors: Same type as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

1.4 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Flush Access Doors with Concealed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
2. Locations: Wall and ceiling.
3. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage.

   a. Finish: Factory prime.

4. Frame Material: Same material and thickness as door.
5. Hinges: Manufacturer's standard.
6. Hardware: Latch.

B. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide frame with gypsum board beads for concealed flange installation.
2. Locations: Wall and ceiling.

3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Uncoated Steel Sheet for Door: Nominal 0.036 inch (0.91 mm), 20 gage.

    a. Finish: Factory prime.

5. Frame Material: Same material, thickness, and finish as door.
6. Hinges: Manufacturer's standard.
7. Hardware: Latch.

C. Hardware:

1. Latch: Cam latch operated by screwdriver.

END OF SECTION 083113

SECTION 083323 - OVERHEAD COILING DOORS

1.1 SUMMARY

A. Section includes:

1. Insulated service doors.
2. Fire-rated separation doors.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.

B. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

C. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1.

1.3 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.4 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch (0.71 mm) and as required to meet requirements.

2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
3. Gasket Seal: Provide insulated slats with manufacturer's standard interior-to-exterior thermal break or with continuous gaskets between slats.

1.5 CURTAIN ACCESSORIES

A. Smoke Seals: Equip each fire-rated door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling by a qualified testing agency.

B. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.
1. At door head, use 1/8-inch- (3-mm-) thick, replaceable, continuous sheet secured to inside of hood.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- (3-mm-) thick seals of flexible vinyl, rubber, or neoprene.

C. Automatic-Closing Device for Fire-Rated Doors: Equip each fire-rated door with an automatic-closing device that is inoperative during normal door operations and that has a governor unit complying with NFPA 80 and an easily tested and reset release mechanism designed to be activated by the following:
1. Building fire-detection and -alarm systems and manufacturer's standard door-holder-release devices.

1.6 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

B. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 110513 "Common Motor Requirements for Equipment" unless otherwise indicated.

C. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

D. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).

E. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

F. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

G. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

1.7 DOOR ASSEMBLY AT LOADING DOCK

A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, manufacturers include, but are not limited to, the following:
   a. Cookson Company.
   b. Cornell Iron Works, Inc.
   c. McKeon Rolling Steel Door Company, Inc.
   d. Overhead Door Corporation.
   e. Raynor.
   f. Wayne-Dalton Corp.
   g. Windsor Door.

B. Operation Cycles: Not less than 20,000.

C. Curtain R-Value: 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W).

D. Door Curtain Material: Galvanized steel.

E. Door Curtain Slats: Flat profile slats of 1-1/2-inch (38-mm) center-to-center height.

F. Door Finish:

1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

1.8 FIRE-RATED DOOR ASSEMBLY

A. Fire-Rated Separation Door: Overhead fire-rated coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. C.H.I. Overhead Doors.
   b. Cookson Company.
   c. Cornell Iron Works, Inc.
   d. Lawrence Roll-Up Doors, Inc.
   e. Mahon Door Corporation.
   f. McKeon Rolling Steel Door Company, Inc.
   g. Overhead Door Corporation.
   h. Raynor.
   i. Wayne-Dalton Corp.
   j. Windsor Door.

B. Operation Cycles: Not less than 10,000.

C. Fire Rating: 1 hour with smoke control.

D. Door Curtain Material: Painted steel.

E. Door Curtain Slats: Flat profile slats of 1-1/2-inch (38-mm) center-to-center height.

F. Curtain Jamb Guides: Galvanized steel with exposed finish painted to match adjoining surface.

G. Manual Door Operator: Manufacturer's standard crank operator.

H. Electric Door Operator:

1. Usage Classification: Light duty, up to 10 cycles per hour>.
2. Motor Exposure: Interior.
3. Emergency Manual Operation: Crank type.
4. Other Equipment: Audible and visual signals.

I. Door Finish:

1. Factory Finish: Manufacturer’s baked enamel or powder coat, standard color.

END OF SECTION 083323

SECTION 083513 – HORIZONTAL SLIDING ACCORDION TYPE FIRE DOORS

1.1 SUMMARY

A. This Section includes normally open sliding fire doors and custom pocket doors concealing sliding doors in closed position.

1.2 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. LEED Submittals

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.3 QUALITY ASSURANCE

A. Fire-Rated Door Assembly: Sliding fire door, complete with labeled hardware, that comply with NFPA 80, are identical to door assemblies tested for fire-test-response characteristics per ASTM E 152, UL 10B and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Cornell Iron Works Tranzform Fire Doors

Won-Door “Fireguard 90”,

McKeon Rolling Steel Door Co.

1.5 MATERIALS

A. Cold-Rolled Steel Sheets: Commercial-quality carbon steel, complying with ASTM A 366 (ASTM A 366M) and ASTM A 568 (ASTM A 568M). Enameled coating ins manufacturer’s standard assembly.

B. Hardware and Fasteners: Manufacturer's standard units.

1.6 SLIDING ACCORDION TYPE FIRE DOORS

A. General: Provide door assemblies identical to those that meet the requirements for acceptable performance when tested for fire-test-response characteristics per ASTM E 152, and are

labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction. Provide manufacturer's standard design of independently with rigid core bonded to both faces and reinforced on edges.

B. Construction: Two parallel accordion type walls suspended independently except at leading edge. Panels formed from 24 gauge enamel coated steel, connected by full height panel hinges.

C. Perimeter Seals: Continuous extruded vinyl sweeps connected to form fire and smoke seal.

D. Automatic Closing System:

1. Electronic control box, motor operator assembly and leading edge obstruction detector, activated by fire alarm system.
2. Motor operation by 12VDC from control box.
3. Battery charging system hard wired from building electrical system to maintain battery at full charge level.

E. Door Finish: Manufacturer's standard, factory-applied finish.

F. Operating Hardware: Manufacturer's standard, labeled, automatic-closing-type, sliding fire door assemblies complete with track, adjustable roller guides, binders, floor stops, cables, sheaves, counterweights, and fusible links. Furnish necessary hangers, fittings, and fasteners required for attaching hardware to door and for door sliding operation, including latch or handle for manual operation.

G. Exit Hardware/Obstruction Device: Pressure on door leaf causes door to open, pause and reclose. Obstruction device to be electrically actuated pressure bar located on leading edge of operable leaf or similar operation as manufacturers standard.

H. Pocket Doors: Provide doors to conceal fire doors in open position, matching adjacent doors in the structure.

END OF SECTION

SECTION 083616.13 BARN (SLIDING) DOOR

1.01 SUMMARY

A. Sliding Barn Doors flush wood, aluminum frames and related hardware for clinic doors

1.02 QUALITY ASSURANCE

A. Product Options: drawings indicate size, profiles, and dimensional requirements of interior aluminum frames and doors.
B. Source: Obtain sliding aluminum framed doors from single source
C. Manufacturer's Qualifications: Manufacturer regularly engaged for past 5 years in manufacture of sliding doors similar to that specified.

1.03 PERFORMANCE

A. Flame spread test ASTM E-84.03a. Passed IBC Code 2006 Class A, Class B and Class C.
B. Barn door acoustical seals are integrated into the wall module connection detail.
C. Soft self-closing mechanism integrated with top track.

1.04 MANUFACTURER

A. Aurora Doors., Inc. Website:auroradoors.com E-mail: info@auroradoors.com 10910 Holly Drive, Everett, WA 98204 (425-740-6011)
B.

1.05 INTERIOR SLIDING ALUMINUM-FRAMED DOORS AND PARTITIONS

A. Interior Aluminum-Framed Top-Hung Sliding Doors: Model: Aurora High Performance Sliding Door System by Aurora Doors
B. Specified Wall Thickness: 1/8”
C. Frame Profiles: Extruded aluminum
   1. Finish:
      1. Standard: Painted Hardcoat (Polyester) Finish. Meets AAMA 2604 Manufacturers Standard Colors:

D. Door Leafs. All Doors to be factory machined for hardware including pilot and function holes.

   1. Flush wood doors to be constructed with SCLC cores. Doors to be 5 ply construction, assembled with hot press methods and matching edges applied before faces. Exposed crossbands not allowed. (Specify Veneer species / Finish options) Wood veneer doors to be factory finished to match wood doors specified in Section 0821416.

E. Components:
   1. Single Top Track: Aurora Systems track

2. Floor Guide: Integral Jamb Aurora floor guide.

3. Valances: Extruded aluminum with integral end caps

4. Top Rollers: tandem nylon roller sized to match door weight

F. Accessories:
   1. Soft-Closer: Soft and Self-closing mechanism at [one] or [both] sides of door leaf.
   2. Synchronal Door Drive Coordinator for door pairs.
   3. Handles:
      A. Aurora Standard Ladder pull: 16” long x 1” diameter. Finish: US32D Satin Stainless Steel
   4. Door Locks:
      A. “ADA Thumbturn inside with occupancy indicator / custodial override outside”, FSB Hook bolt lock (Finish US32D)
   5. Gaskets for improved acoustical performance: acoustic seal by Aurora Doors.

END OF SECTION

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

1.1 SUMMARY

A. Section Includes:

1. Exterior and interior manual-swing entrance doors and door-frame units.

2. Thermal Performance to meet IECC 2012 is required

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
2. Product Data for Credit MR4.2: For recycled aluminum content of 20% minimum.

1.3 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kawneer North America.
2. Tubelite.
   Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
   Arcadia
   Manko

1.4 FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken at all framing other than immediately adjacent to door opening. Door frames will be non-thermal.
2. Glazing System: Flush glazed on four sides.
3. Glazing Plane: Front.
4. Fabrication Method: Field-fabricated stick system.

B. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

   a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
   b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
   c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
   d. Structural Profiles: ASTM B 308/B 308M.
   e. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

    a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

1.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch-(3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded.
2. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets

B. Finish: Class 1 Clear Anodic

1.6 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard EPDM, Santoprene, or Silicone compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; single-component, neutral-curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed systems manufacturers for this use.
2. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Color: From manufacturer’s full range of standard colors.

END OF SECTION 084113

SECTION 084229.33 - SWINGING AUTOMATIC ENTRANCES

1.1 SUMMARY

A. Section includes exterior and interior, swinging, power-operated automatic entrances.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
2. Product Data for Credit MR4.2: For recycled aluminum content of 20% minimum.

1.3 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: ASTM B 221 (ASTM B 221M).
2. Sheet and Plate: ASTM B 209 (ASTM B 209M).

B. Steel Reinforcement: Reinforcement with corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Use surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

C. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.

D. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

E. Glazing: As specified in Section 088000 "Glazing."

F. Sealants and Joint Fillers: As specified in Section 079200 "Joint Sealants."

G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

H. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1.4 AUTOMATIC ENTRANCE ASSEMBLIES

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Power-Operated Door Standard: BHMA A156.10.

1.5 SWINGING AUTOMATIC ENTRANCES

A. General: Provide manufacturer's standard automatic entrances including doors, framing, headers, door operators, controls, and accessories required for a complete installation.

B. Swinging, Power-Operated Automatic Entrance:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Besam Entrance Solutions; Subsidiary of ASSA ABLOY Entrance Systems.
b. DORMA Automatics; Division of DORMA Group North America.
c. Horton Automatics; a division of Overhead Door Corporation.
d. Nabco Entrances Inc.
e. Stanley Access Technologies, LLC; Division of Stanley Security Solutions.
f. Tormax Technologies, Inc.

2. Configuration: Pair of swinging doors with transom.

a. Traffic Pattern: Two way.
b. Mounting: Between jambs.

3. Operator Features:

a. Power opening and power-assist spring closing.
b. Adjustable opening and closing speeds.
c. Adjustable hold-open time between zero and 30 seconds.
d. Adjustable backcheck and latching.
e. Obstruction recycle.

4. Controls: Activation and safety devices according to BHMA standards.

a. Combination Activation and Safety Device: Combination motion/presence sensor.

1.6 ENTRANCE COMPONENTS

A. Framing Members: Extruded aluminum, minimum 0.125 inch (3.2 mm) thick and reinforced as required to support imposed loads.

1. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch (1.6-mm) wall thickness.

B. Stile and Rail Doors: 1-3/4-inch- (45-mm-) thick, glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie-rods that span full length of top and bottom rails.

C. Headers: Fabricated from minimum 0.125-inch- (3.2-mm-) thick extruded aluminum and extending full width of automatic entrance units to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

1. Mounting: Surface mounted.
2. Capacity: Capable of supporting doors up to 175 lbs. (79 kg) per leaf over spans up to 14 feet (4.3 m) without intermediate supports.

a. Provide sag rods for spans exceeding 14 feet (4.3 m).

D. Signage: Affixed to both sides of each door as required by BHMA A156.10 for type of door and its operation.

1.7 DOOR OPERATORS AND CONTROLS

A. General: Provide operators and controls, which include activation and safety devices, according to BHMA standards, for condition of exposure, and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

B. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement.

C. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; fully enclosed by its plastic housing; adjustable to provide detection-field sizes and functions required by BHMA A156.10.

D. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection-field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.

E. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

1.8 HARDWARE

A. General: Provide units in sizes and types recommended by automatic entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish unless otherwise indicated.

B. Manual Opening for Power-Operated Swinging Doors: Provide hardware that, in a power failure, allows door to open with a manual force not to exceed 30 lbf (133 N) according to BHMA A156.10.

C. Hinges:

1. Center-Pivot Sets: BHMA A156.4, Grade 1, with exposed parts of cast-aluminum alloy.

D. Push Bars: As selected by Architect from manufacturer's full range of full-door-width, single push bars.

E. Pull Handles: As selected by Architect from manufacturer's full range of pull handles and plates.

F. Thresholds: BHMA A156.21, extruded-aluminum raised thresholds; with beveled edges with a slope of not more than 1:2 and a maximum height of 1/2 inch (13 mm). Provide cutouts as required for door operating hardware.

G. Weather Stripping: Replaceable components.

1. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

2. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
3. Weather Sweeps: Nylon brush sweep mounted to underside of door bottom.

H. Finger Guards: Collapsible neoprene or PVC gasket.

END OF SECTION 084229.33

SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

1.1 SUMMARY

A. Section includes glazed aluminum curtain walls.

B. Compliance with 2012 IECC is required

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
2. Product Data for Credit MR4.2: For recycled aluminum content of 20% minimum.

1.3 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer 1600 wall systems 1, 2, & 5, or comparable product by one of the following:

1. Kawneer North America.
2. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company Wausau Window and Wall Systems.

1.4 FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally improved.
2. Glazing System: Retained mechanically with gaskets on four sides and two-side structural silicone glazed (SSA).
3. Glazing Plane: Front.
4. Fabrication Method: Field-fabricated stick system.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
d. Structural Profiles: ASTM B 308/B 308M.

2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

    a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

1.5 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: Comply with Section 088000 "Glazing."

D. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less.

END OF SECTION 084413

SECTION 086300 - METAL-FRAMED SKYLIGHTS

1.1 SUMMARY

A. Section includes skylights with metal framing.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For sealants used inside the weatherproofing system, documentation including printed statement of VOC content.

1.3 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacutrers include, but are not limited to, the following:

1. Architectural Glazing Technologies.
2. Naturalite Skylight Systems; Vistawall Group.
3. Skyline Sky-Lites, LLC.

1.4 FRAMING SYSTEMS

A. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
4. Structural Profiles: ASTM B 308/B 308M.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.

C. Fasteners and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. At pressure caps, use ASTM A 193/A 193M stainless-steel screws.
2. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
3. Reinforce members as required to receive fastener threads.

D. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than 0.040 inch (1.016 mm) thick.

E. Framing Gaskets: Manufacturer's standard.

1.5 GLAZING

A. Glazing: As specified in Section 088000 "Glazing."

B. Spacers, Setting Blocks, and Gaskets: Manufacturer's standard elastomeric types.

C. Bond-Breaker Tape: Manufacturer's standard tetrafluoroethylene-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

D. Glazing Sealants: As recommended in writing by manufacturer.

1. Sealants used inside the weatherproofing system shall have a VOC content as indicated when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Structural Sealant: ASTM C 1184, neutral-curing silicone formulation compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant, and approved by structural-sealant manufacturer for use in metal-framed skylights indicated.

   a. VOC Content: 100 g/L or less.

3. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; neutral-curing silicone formulation compatible with structural sealant and other components with which it comes in contact; and recommended in writing by structural- and weatherseal-sealant and metal-framed skylight manufacturers for this use.

   a. VOC Content: 250 g/L or less.

END OF SECTION 086300

SECTION 087100 - DOOR HARDWARE

1.1 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

   a. Swinging doors.
   b. Fire-rated swinging doors.
   c. Other doors to the extent indicated.

2. Cylinders for doors specified in other Sections.
3. Electrified door hardware.

1.2 SUBMITTALS

A. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
2. Content: Include the following information:

   a. Identification number, location, hand, fire rating, and material of each door and frame.
   b. Type, style, function, size, quantity, and finish of each door hardware item.
   c. Complete designations of every item required for each door or opening including name and manufacturer.
   d. Fastenings and other pertinent information.
   e. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   f. Explanation of abbreviations, symbols, and codes contained in schedule.
   g. Mounting locations for door hardware.
   h. Door and frame sizes and materials.
   i. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

      1) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

   j. List of related door devices specified in other Sections for each door and frame.

3. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

B. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.3 QUALITY ASSURANCE

A. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Keying Conference: In addition to Owner, Construction Manager, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's Security Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

1.4 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six (6) months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

1.5 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Products:

a. Finish: Shall be US26D, unless otherwise noted.
b. Manufacture Standard:

1) Butts: Hager, McKinney, Hager, Ives*
2) Locksets: Falcon* No Substitute
3) Closers: LCN* No Substitute
4) Exit Devices: Von Duprin* No Substitute
5) Electronics: Schlage Electronics* No Substitute
6) Trim: BBW, Rockwood, Hager, Ives*
7) Weatherstrip: Pemko, National Guard*
8) Continuous Hinges: HagerRoton, Ives*
9) Magnetic Door Holders: LCN*
10) Rem Mullion: Von Duprin*

1.6 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section. Products are identified by using hardware designation numbers of the following:

1. Manufacturer's Product Designations: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated or, where more than one manufacturer is specified under the Article "Manufacturers" in Part 2 for each hardware type, the comparable product of one of the other manufacturers that complies with requirements.

2. ANSI/BHMA designations used elsewhere in this Section or in schedules to describe hardware items or to define quality or function are derived from the following standards. Provide products complying with these standards and requirements specified elsewhere in this Section.

a. Butts and Hinges: ANSI A156.1.
b. Bored and Preassembled Locks and Latches: ANSI/BHMA A156.2.
c. Exit Devices: ANSI A156.3.
d. Door Controls - Closers: ANSI A156.4. 180 degree swing only!
e. Auxiliary Locks and Associated Products: ANSI/BHMA A156.5.
f. Architectural Door Trim: ANSI A156.6.
g. Template Hinge Dimensions: ANSI A156.7.
h. Door Controls - Overhead Holders: ANSI A156.8.
i. Mortise Locks and Latches: ANSI A156.13.
j. Closer Holder Release Devices: ANSI A156.15.
k. Auxiliary Hardware: ANSI A156.16.
l. Self-Closing Hinges and Pivots: ANSI A156.17.
m. Materials and Finishes: ANSI A156.18.

1.7 HINGES, GENERAL

A. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Stainless steel with stainless-steel pin.

2. Interior Hinges: Steel with steel pin.
3. Hinges for Fire-Rated Assemblies: Steel with steel pin.

1.8 LOCKS, LATCHES, AND BOLTS

A. Cylindrical Locks - ANSI A156.2 Series 4000, Grade 1 Strength and Operational requirements. Meets A117.1 Accessibility Codes. Latch bolts shall be steel with minimum ½" throw, deadlocking on keyed and exterior functions. ¾" throw anti-friction latchbolt on pairs of fire doors. Locksets to be tested to exceed 3,000,000 cycles. Lock case shall be steel. Lock shall incorporate one piece spring cage and spindle. Provide 5/8" minimum throw of latch and deadbolt used on pairs of doors. Provide Seven Year Warranty.

B. Mortise Locks: ANSI 156.13, Series 1000, Grade 1, mortise lock for commercial and institutional buildings.

1.9 ACCESS CONTROL LOCKSET

A. Trim shall meet or exceed ANSI Standard A156.25 and A156.2, Grade 1 strength and operational requirements. UL294*, UL10C, Fcc Part 15, ADA, RoHS.

B. 125 kHz proximity with 0.75" read range with backlit keypad, 12 button, 3 x 4 matrix with proximity Smart Card multi-technology reader.

1.10 CLOSERS

A. Accessibility Requirements: Where handles, pulls, latches, locks and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural Transportations Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

B. Surface Closers: BHMA A156.4 Grade 1. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome silicon steel spring.

1.11 DOOR OPERATORS / ADA SPECIAL CLOSERS

A. Electro-Hydraulic Operators

1.12 EXIT DEVICES/PANIC HARDWARE

A. General features: BHMA A156.3, Grade 1.

B. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15lbf to release the latch. Locks shall not require use of a key, tool of special knowledge for operation.

C. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to AHJ for panic protection, based on testing according to UL 305.

D. Electric latch retraction devices (Qel), quiet operation both electrically and mechanically. Touchpad retraction, vandal resistant. Device detects pulling out of touchpad repeatedly and responds. 18ga wire requirement/200 ft maximum run.

1.13 TRIM AND STOPS

A. Kick plates, mop plates, and armor plates, shall be .050 gauge with 32D finish. Kick plates to be 10” high, mop plates to be 5” high. All plates shall be two (2) inches less full width of door.

B. Push plates, pull plates, door pulls, and miscellaneous door trim shall be shown in the hardware schedule.

C. Doorstops shall be furnished for all doors to prevent damage to doors or hardware from striking adjacent walls or fixtures. Wall stops are preferred. Floor stops are used only where noted in hardware schedule. Where conditions prohibit the use wall type stops, furnish overhead stops either surface mounted or concealed as noted in hardware sets.

1.14 WEATHERSTRIPPING AND SEALS

A. General: Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1.15 THRESHOLDS

A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.

1.16 HIGH SECURITY KNOX-BOX

A. Furnish and install a Knox-Box Hinged Door #3227 Recessed

SECTION 088000 - GLAZING

1.1 SUMMARY

A. 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 curtain walls.
4. Glazed entrances.
5. Skylights.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

1.3 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

1.4 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

C. Ceramic-Coated Vision Glass: Heat-treated float glass, Condition C; with ceramic enamel applied by silk-screened process; complying with Specification No. 95-1-31 in GANA's Tempering Division's "Engineering Standards Manual" and with other requirements specified.

D. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.

1.5 LAMINATED GLASS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arch Aluminum.
2. Northwestern Industries.
3. Oldcastle Building Envelope.
4. Viracon.

B. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.

1.6 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AGC Glass.
2. Arch Aluminum.
3. Guardian Industries
4. Northwestern Industries.
5. Oldcastle
6. Viracon.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal.
2. Spacer: Aluminum with mill or clear anodic finish.

1.7 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM or silicone gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

1.8 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Colors of Exposed Glazing Sealants: Black.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Applications: Butt jointed glass intersections.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Applications: Structural glazing.

D. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

1.9 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

1.10 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

END OF SECTION 088000

SECTION 092117 - GYPSUM BOARD SHAFT-WALL ASSEMBLIES

1.1 SUMMARY

A. This Section includes the following:

1. Shaft enclosures including gypsum board and related framing.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance:

1. Provide gypsum board shaft-wall assemblies capable of withstanding the full air-pressure loads for maximum heights of partitions without failing and while maintaining an airtight and smoke-tight seal. Evidence of failure includes deflections exceeding limits indicated, bending stresses causing studs to break or to distort, and end-reaction shear causing track (runners) to bend or to shear and studs to become crippled.
2. Provide gypsum board shaft-wall assemblies for horizontal duct enclosures capable of spanning distances indicated within deflection limits indicated.

1.3 SUBMITTALS

A. LEED Submittal:

1. Credits MR 4.1 and 4.2: For products having recycled content, manufacturer's documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

   a. Include statement indicating cost for each product containing steel.

2. Credit MR 5.1 and 5.2: Submit the locations of manufacturing and harvest, extraction or recovery for all products manufactured within 500 miles that also contain raw materials harvested, extracted or recovered within 500 miles. Submit distances in miles, as the crow flies, from the harvest/extraction/recovery site and from the manufacturing site to the Project.

   a. Submit cut sheet and/or letter from manufacturer verifying locations.
   b. Include statement indicating cost for each material and the fraction by weight that is considered regional.

3. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.

1.4 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, the following:

1. American Gypsum Co.

2. G-P Gypsum Corp.
3. Certainteed
4. National Gypsum Company.
5. United States Gypsum Co.

1.5 ASSEMBLY MATERIALS

A. General: Provide materials and components complying with requirements of fire-resistance-rated assembly.

B. Steel Framing: ASTM C 645.

1. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized coating.

C. Gypsum Liner Panels, Type X: Manufacturer's proprietary fire-resistive liner panels in 1-inch (25.4-mm) thickness and with moisture-resistant paper faces.

1. Long Edges: Double bevel.

D. Gypsum Wallboard: ASTM C 36, type C or X core as required by fire-resistance-rated assembly indicated.

1. Edges: Tapered.

E. Sound Attenuation Blankets: ASTM C 665 for Type I, unfaced mineral-fiber-blanket insulation produced by combining thermosetting resins with mineral fibers manufactured from slag or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.

F. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.

1. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.6 GYPSUM BOARD SHAFT WALL

A. Fire-Resistance Rating

B. Sustained Air-Pressure Loads: 5.0 lbf/sq. ft..

C. Deflection Limit: L/240.

D. Studs: Manufacturer's standard profile for repetitive members and corner and end members and for fire-resistance-rated assembly indicated.

1. Depth: 4 inches (101.6 mm) unless otherwise shown.

2. Min. Base Metal Thickness: Manufacturer's standard thickness that complies with the structural performance requirements for stud depth indicated, but not less than .396 (20 gauge)

E. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches (51 mm), in depth matching studs.

F. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches (76.2 mm), in depth matching studs, and not less than 0.0341 inch (0.87 mm) thick.

G. Room-Side Finish: Gypsum board.

H. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.

I. STC Rating: 52.

J. Cavity Insulation: Sound attenuation blankets.

END OF SECTION 092117

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings and soffits.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

1.3 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413.

1.4 FRAMING SYSTEMS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.0312 inch (20 gauge).

C. Slip-Type Head Joints: Where indicated, provide one of the following in thickness not less than indicated for studs and in width to accommodate depth of studs:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes due to deflection of structure above, in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1) Steel Network Inc. (The); VertiClip SLD/VertiTrack VTD Series.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.0312 inch (20 gauge).

E. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 1-1/2 inches (38 mm) minimum.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.03123 inch (20 gauge).
2. Depth: 7/8 inch (22.2 mm).

G. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Equal to RSIC-1 as manufactured by PAC International, Inc.

H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: Minimum 3/4 inch (19 mm).
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.0312 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.018 inch (0.45 mm), and depth required to fit insulation thickness indicated.

1.5 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Flat Hangers: Steel sheet, minimum 1 by 3/16 inch (25 by 5 mm) by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.

1. Depth: 1-1/2 inches (38 mm).

F. Furring Channels (Furring Members):

1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.

a. Minimum Base-Metal Thickness: 0.0312 inch.

2. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.

a. Configuration: Equal to RSIC-1 as manufactured by PAC International, Inc.

G. Grid Suspension system for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation.
c. USG Corporation; Drywall Suspension System.

1.6 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide foam gasket.

1. Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
3. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.

    a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
    b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

4. Product Data for Credit IEQ 4.1: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.

1.3 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.4 GYPSUM BOARD, GENERAL

A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than ten percent.

B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site.

1.5 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. National Gypsum Company.
5. PABCO Gypsum.
6. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

1.6 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. C-Cure; C-Cure Board 990.
   b. CertainTeed Corp.; FiberCement BackerBoard.
   c. Custom Building Products; Wonderboard.

2. Thickness: 1/2 inch (12.7 mm).
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

B. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corp.
   b. Georgia-Pacific Gypsum LLC.
   c. PABCO Gypsum.
   d. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.

1.7 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.

B. Aluminum Trim: ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

1.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1.9 AUXILIARY MATERIALS

A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

B. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).

1. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than ten percent.

C. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Acoustical Joint Sealant: Manufacturer’s standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
b. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

F. Vapor Retarder: As specified in Section 072100 "Thermal Insulation."

END OF SECTION 092900

SECTION 093000 - TILING

1.1 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Stone thresholds.
3. Waterproof membrane.
4. Crack isolation membrane for elevated slabs
5. Tile backing panels.
6. Metal edge strips.

B. All Assemblies Performance Levels shall be designed to a minimum Moderate Traffic Service Requirement and Com2 or Com3 Environmental Classification as established by TCNA

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For adhesives and grouts, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.3: For tile floors, documentation from an independent testing agency indicating compliance with the FloorScore Standard.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.4 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. Tile Type: Factory-mounted unglazed ceramic mosaic tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Olean; Division of Dal-Tile International Inc.
b. Crossville, Inc.
c. Daltile; Division of Dal-Tile International Inc.

2. Composition: Porcelain.
3. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

C. Tile Type: Unglazed square-edged quarry tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Olean; Division of Dal-Tile International Inc.
b. Daltile; Division of Dal-Tile International Inc.
c. Quarry Tile Co.
d. Seneca Tiles, Inc.

2. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

D. Tile Type: Unglazed paver tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Olean; Division of Dal-Tile International Inc.
b. Daltile; Division of Dal-Tile International Inc.
c. GranitiFiandre; c/o Trans Ceramica, Ltd.

2. Composition: Porcelain.
3. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

E. Tile Type: Glazed wall tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Olean; Division of Dal-Tile International Inc.
b. Daltile; Division of Dal-Tile International Inc.
c. Florida Tile Industries, Inc.

2. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Insert paragraphs for special purpose tile if required.

1.5 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

B. Marble or Limestone Thresholds: ASTM C 503, with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish.

1.6 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325.

1. Thickness: 1/2 inch (12.7 mm).

B. Fiber-Cement Underlayment: ASTM C 1288, in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 1/4 inch (6.4 mm).

1.7 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated.

B. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch (0.203-mm) nominal thickness.

1.8 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated.

B. Chlorinated-Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch (0.76-mm) nominal thickness.

C. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch (0.203-mm) nominal thickness.

D. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1.9 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at project site.
2. For wall applications, provide nonsagging mortar.

C. Medium-Bed, Latex-Portland Cement Mortar: ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8 inch (16 mm).

1. Prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which onbly water must be added at project site.

D. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.10 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10.

B. Polymer-Modified Tile Grout: ANSI A118.7.

1. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.

C. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D.

1.11 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 "Joint Sealants."

1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

C. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

1.12 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, exposed-edge material.

C. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

1.1 SUMMARY

A. Section includes acoustical panels, wood panels for Lobby finishes, and exposed suspension systems for ceilings. Basis of Design Products listed establish a level of quality only.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

1.3 MAINTENANCE MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 5 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
3. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.

1.5 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent.

B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

C. Acoustical Panel Standard: Comply with ASTM E 1264.

D. Metal Suspension System Standard: Comply with ASTM C 635.

E. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1.6 ACOUSTICAL PANELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. Chicago Metallic Corporation.
4. Tectum Inc.
5. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Ceiling Panels Type 1: Wood Veneer Ceiling Units (Public Entry/Main Lobby)

1. Basis of Design: Armstrong WoodWorks Vector Bamboo Patina 5401W1BAP as manufactured by Armstrong World Industries.
2. Surface Texture: Smooth.
3. Composition: Wood.
4. Finish: Manufacturer's standard natural veneer.
5. Species: Armstrong Bamboo Patina.
6. Size: 24 inches x 24 inches x 3/4 inch.
7. Non Perforated.
8. Edge Banding and Trim: To match face veneer.
9. Flame Spread: Class A (HPVA).
10. Dimensional Stability: Standard.

C. Ceiling Panels Type 2: (Patient/treatment Areas)

1. Basis of Design: Health Zone Ultima 1935 as manufactured by Armstrong World Industries.
2. Surface Texture: Fine.
3. Composition: Mineral fiber.
4. Color: White.
5. Size: 24 inches x 24 inches x 3/4 inch.
6. Edge Profile: Square lay-in for interface with Prelude XL 15/16" Exposed Tee.
7. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.70.
8. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 38.
9. Emissions Testing: Section 01350 Protocol, < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality."
10. Flame Spread: ASTM E 1264; Class A (UL).
11. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.86.
12. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
13. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

D. Ceiling Panels Type 3: (Executive Office areas)

1. Basis of Design: Dune 1772 as manufactured by Armstrong World Industries.
2. Surface Texture: Fine.
3. Composition: Mineral fiber.
4. Color: White.
5. Size: 24 inches x 24 inches x 5/8 inch.

6. Edge Profile: Square lay-in for interface with compatible Armstrong grid.
7. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.50.
8. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 30.
9. Emissions Testing: Section 01350 Protocol, < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality."
10. Flame Spread: ASTM E 1264; Class A (UL).
11. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.83.
12. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
13. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

E. Ceiling Panels Type 4: (For use only where open office environments exist and Sound Transmission to adjacent areas is not a concern)

1. Basis of Design: Optima Open Plan 3250 as manufactured by Armstrong World Industries.
2. Surface Texture: Fine.
3. Composition: Fiberglass.
4. Color: White.
5. Size: 48 inches x 48 inches x 1 inch (Optima Open Plan Tegular also available in 2x4, 4x4, 2x6 and 2x8).
6. Edge Profile: Square tegular for interface with compatible Armstrong grid.
7. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.95.
8. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, not applicable.
9. Emissions Testing: Section 01350 Protocol, < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality."
10. Flame Spread: ASTM E 1264; Class A (UL).
11. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.90.
12. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
13. Antimicrobial Protection: Inherent - resists the growth of mold/mildew and bacterial growth.

1.7 METAL SUSPENSION SYSTEMS, GENERAL

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. Chicago Metallic Corporation.
4. USG Interiors, Inc.; Subsidiary of USG Corporation.

C. Suspension System for Wood Panel System:

1. Basis of Design: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.
2. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A 653. Main beams and cross tees are double-web steel construction with 15/16 inch type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel (aluminum or stainless steel) in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).
3. Structural Classification: ASTM C 635 Heavy Duty.
4. Color: Black.
5. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
6. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.
7. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.
8. Accessories:

    a. 4 inch Woodworks Trim with wood substrate; 8 foot x 3/4 inch x 4 inches, item #6954BAP.

D. Suspension System for Acoustical Units:

1. Basis of Design: Prelude XL 15/16" Exposed Tee system as manufactured by Armstrong World Industries, Inc.
2. Components: Main beams and cross tees In accordance with the International Building Code, Section 1621 for Category D, E and F as described in ESR-1308.
3. Structural Classification: ASTM C 635 Heavy Duty.
4. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
5. Attachment Devices: In accordance with the International Building Code, Section 1621 for Category D, E, and F.
6. Wire for Hangers and Ties: In accordance with the International Building Code, Section 1621.
7. Wall Moldings: In accordance with the International Building Code, Section 1621 for Category D, E. and F or method as described in ESR-1308.

    a. Nominal 7/8 inch x 7/8 inch hemmed, pre-finished angle molding 7800.

8. Accessories:

    a. BERC2 - 2 inch Beam End Retaining Clip, 0.034 inch thick, hot-dipped galvanized cold-rolled steel per ASTM A568 - used to join main beam or cross tee to wall molding.
    b. SJCG - Seismic Joint Clip, 5 inches x 1-1/2 inch, hot-dipped galvanized cold-rolled steel per ASTM A568. The two piece unit is designed to accommodate a seismic separation joint. The clip is compatible with 15/16 inch and 9/16 inch grid systems including Prelude, Suprafine, and Silhouette The SJCG is not suitable for use with Vector panel installations.
    c. SJMR15 - Seismic Joint Clip - Main Beam, 1 inch x 4 inches, commercial quality cold rolled hot dipped galvanized steel per ASTM A568, chemically cleansed.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.3: For resilient base, documentation from an independent testing agency indicating compliance with the FloorScore Standard.

1.3 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish not less than 10 linear feet (3 linear m of each different type, color, pattern, and size of resilient product installed.

1.4 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Resilient base shall comply with requirements of FloorScore certification.

1.5 THERMOSET-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products, Division of Burke Industries Inc.
3. Flexco.
4. Johnsonite.
5. Roppe Corporation, USA.

B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style and Location: Style B, Cove

C. Thickness: 0.125 inch (3.2 mm).

D. Height: 4 inches (102 mm).

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed.

H. Colors: As selected by Architect from manufacturer’s full range.

1.6 RUBBER MOLDING ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Roppe Corporation, USA.
2. VPI, LLC, Floor Products Division.

B. Description: Rubber reducer strip for resilient flooring, joiner for tile and carpet, transition strips, and resilient flooring and carpet joiner.

C. Profile and Dimensions: As required for conditions.

D. Locations: As required for conditions.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

1.7 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less.

END OF SECTION 096513

SECTION 096516 - RESILIENT SHEET FLOORING

1.1 SUMMARY

A. Section includes resilient sheet flooring.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives and chemical-bonding compounds, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For adhesives and chemical-bonding compounds, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.3: For resilient sheet flooring, documentation from an independent testing agency indicating compliance with the FloorScore standard.

1.3 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Covering: Furnish quantity not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

1.4 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. FloorScore Compliance: Resilient sheet flooring shall comply with requirements of FloorScore certification.

1.5 PRODUCTS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Forbo Industries, Inc; Marmoleum.
2. LG Hausys.; NATURELIFE.
3. Mannington Mills, Inc; BioSpec MD.
4. TOLI International; Mature.

1.6 UNBACKED RESILIENT SHEET FLOORING

A. Product Standard: ASTM F 1913.

B. Thickness: 0.080 inch (2.0 mm).

C. Wearing Surface: Smooth or embossed.

D. Sheet Width: As standard with manufacturer.

E. Seamless-Installation Method: Heat welded.

F. Colors and Patterns: As selected by Architect from full range of industry colors.

1.7 RESILIENT SHEET FLOORING WITH BACKING

A. Product Standard: ASTM F 1303.

1. Type (Binder Content): Type I, minimum binder content of 90 percent.
2. Wear-Layer Thickness: Grade 1.
3. Overall Thickness: As standard with manufacturer.
4. Backing Class: Class A (fibrous).

B. Wearing Surface: Smooth or embossed.

C. Sheet Width: As standard with manufacturer.

D. Seamless-Installation Method: Heat welded.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

1.8 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less.

C. Seamless-Installation Accessories:

1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.

a. Color: As selected by Architect from manufacturer's full range.

2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.

a. Bonding compound shall have a VOC content of 510 g/L or less.

D. Integral-Flash-Cove-Base Accessories:

1. Cove Strip: 1-inch (25-mm) radius provided or approved by resilient sheet flooring manufacturer.

2. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by resilient sheet flooring manufacturer.
3. Corners: Metal inside and outside corners and end stops provided or approved by resilient sheet flooring manufacturer.

E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient sheet flooring manufacturer.

END OF SECTION 096516

SECTION 096536 - STATIC-CONTROL RESILIENT FLOORING

1.1 SUMMARY

A. Section Includes:

1. Static-dissipative, solid vinyl floor tile

1.2 PERFORMANCE REQUIREMENTS

A. Static-Dissipative Properties: Provide floor coverings with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.

1. Electrical Resistance: Test per ASTM F 150 with 100-V applied voltage.

a. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.
b. Average no less than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.

2. Static Generation: Less than 300 V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
3. Static Decay: 5000 to 0 V in less than 0.25 seconds when tested per FED-STD-101C/4046.1.

B. FloorScore Compliance: Static-control resilient flooring shall comply with requirements of FloorScore Standard.

1.3 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.3: For static-control resilient flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.
4. Product Data for Credit MR 4.1: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

a. Include statement indicating costs for each product having recycled content.

1.4 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.5 STATIC-DISSIPATIVE RESILIENT FLOOR COVERINGS

A. Static-Dissipative, Solid Vinyl Floor Tile: ASTM F 1700, Class I (monolithic), Type A (smooth surface).

1. Design Standard: Subject to compliance with requirements, provide Forbo Flooring, Inc.; Colorex SD Static Dissipative Vinyl Tile or a comparable product by one of the following:

a. AB ElectroStatic, a division of American Biltrite (Canada) Ltd.
b. Flexco.
c. Gerflor, Architectural Floor Systems, Inc.
d. 3M Specified Construction Products Division.
e. VPI, LLC.

2. Thickness: In manufacturer's standard thickness, but not less than 0.08 inch (2.0 mm).
3. Colors and Patterns: As selected by Architect from full range of industry colors.

1.6 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor covering system to ground connection.

1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
b. Rubber Floor Adhesives: Not more than 60 g/L.

C. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor covering system to ground connection.

END OF SECTION 096536

SECTION 096813 - TILE CARPETING

1.1 SUMMARY

A. Section includes modular, tufted carpet tile.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit EQ 4.3:

a. For carpet tile, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
b. For installation adhesive, documentation including printed statement of VOC content.

1.3 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.4 CARPET TILE

A. Fiber Content: 100 percent nylon 6, 6.

B. Fiber Type: EcoSolution Q Nylon or approved equal.

C. Pile Characteristic: Multi-level pattern loop pile.

D. Density: 7,920 oz./cu. yd..

E. Pile Thickness: 0.10 inches for finished carpet tile.

F. Stitches: 12 stitches per inch.

G. Gage: 1/12 ends per inch.

H. Surface Pile Weight: 22 oz./sq. yd..

I. Primary Backing/Backcoating: Reinforced thermoplastic copolymer.

J. Secondary Backing: EcoWorx Tile Backing or approved equal.

K. Applied Soil-Resistance Treatment: SSP - Shaw Soil Protection or approved equal.

L. Antimicrobial Treatment: Florsept system or approved equal.

M. Performance Characteristics: As follows:

1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D 7330.
2. Critical Radiant Flux Classification: Not less than 0.22 W/sq. cm.
3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.
4. Tuft Bind: Not less than 8 lbf (36 N) according to ASTM D 1335.
5. Delamination: Not less than 4 lbf/in. (18 N/mm) according to ASTM D 3936.
6. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Resistance to Insects: Comply with AATCC 24.
9. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
10. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
11. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
12. Electrostatic Propensity: Less than 2.5 kV according to AATCC 134.
13. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.

1.5 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

END OF SECTION 096813

SECTION 097200 - WALL COVERINGS

1.1 SUMMARY

A. Section Includes:

1. Vinyl wall covering.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives, including printed statement of VOC content.
2. Product Data for Credit IEQ 4.2: For paints and coatings, including printed statement of VOC content.

1.3 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wall-Covering Materials: For each type, full-size units equal to 5 percent of amount installed.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: As follows, per ASTM E 84:

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 50 or less.

2. Fire-Growth Contribution: Textile wall coverings complying with acceptance criteria of UBC Standard 8-2.
3. Fire-Growth Contribution: Textile wall coverings tested according to NFPA 286 and complying with test protocol and criteria in the 2003 IBC.

1.5 VINYL WALL COVERING

A. Vinyl Wall-Covering Standards: Provide mildew-resistant products complying with the following:

1. CFFA-W-101-D for Type II, Medium-Duty products.
2. ASTM F 793 for strippable wall coverings that qualify as Category V, Type II, Commercial Serviceability products.

B. Total Weight Excluding Coatings: 16-20 oz./ln. yd.

C. Width: 54 inches (1372 mm).

D. Backing: Scrim, osnaburg or nonwoven fabric.

1. Fiber Content: Cotton, polyester, polyester cellulose, and TPO.

E. Stain-Resistant Coating: Per manufacturer's recommendations.

1.6 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer.

1. Adhesive shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Primer/Sealer: Mildew resistant, complying with requirements in [Section 099123 "Interior Painting"] Section <Insert Section number> "<Insert Section title>" and recommended in writing by wall-covering manufacturer for intended substrate.

C. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall-covering manufacturer.

D. Seam Tape: As recommended in writing by wall-covering manufacturer.

END OF SECTION 097200

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates.

1.2 MAINTENANCE MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.3 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. Pratt & Lambert.
3. Sherwin-Williams Company (The).

1.4 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.

B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction, including Utah Administrative Code R307-361 – Architectural Coatings.

1.5 EXTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkyd, anti-corrosive for metal.
b. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5.

B. Galvanized-Metal Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5).

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Concrete masonry units (CMU).
3. Steel.
4. Galvanized metal.
5. Gypsum board.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.

1.3 MAINTENANCE MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.4 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. Pratt & Lambert.
3. Sherwin-Williams Company (The).

1.5 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.

A. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site including Utah Administrative Code R307-361 – Architectural Coatings.

B. the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 100 g/L.
3. Dry-Fog Coatings: 100 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Floor Coatings: 100 g/L.

1.6 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: MPI #4.

1.7 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

1.8 METAL PRIMERS

A. Primer, Alkyd, Quick Dry, for Metal: MPI #76.

B. Primer, Galvanized, Water Based: MPI #134.

C. Primer, Rust-Inhibitive (Water Based): MPI #107.

D. Primer, Cementitious Galvanized-Metal: MPI #26.

1.9 WATER-BASED PAINTS

A. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1): MPI #143.

B. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 2): MPI #144.

C. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3): MPI #145.

D. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5): MPI #147.

1.10 DRY FOG/FALL COATINGS

A. Dry Fall, Alkyd, Flat: MPI #55.

1.11 FLOOR COATINGS

A. Sealer, Water Based, for Concrete Floors: MPI #99.

END OF SECTION 099123

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of high-performance coating systems on the following substrates:

1. Exterior Substrates:

   a. Steel.

2. Interior Substrates:

   a. Steel.

1.2 SUBMITTALS

A. LEED Submittals:

1. Product Data for Credit EQ 4.2: For interior coatings, documentation including printed statement of VOC content.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.4 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide products by one of the following:

1. Sherwin Williams; Industrial and Marine Coatings.
2. Tnemec Company, Inc.

1.5 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each coating 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. Provide products of same manufacturer for each coat in a coating system.

B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior coatings applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: 250 g/L.
5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
6. Pre-Treatment Wash Primers: 420 g/L.
7. Floor Coatings: 100 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.

1.6 METAL PRIMERS

A. Primer, Zinc-Rich, Inorganic: MPI #19.

1.7 EPOXY COATINGS

A. Epoxy, High-Build, Low Gloss: MPI #108.

1.8 POLYURETHANE COATINGS

A. Polyurethane, Two-Component, Pigmented, Gloss (Gloss Level 6): MPI #72.

1.9 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Pigmented Polyurethane over Inorganic Zinc-Rich Primer and High-Build Epoxy System:

a. Prime Coat: Primer, zinc-rich, inorganic, MPI #19.
b. Intermediate Coat: Epoxy, high-build, low gloss, MPI #108.
c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.

B. Galvanized-Metal Substrates:

1. Pigmented Polyurethane System:

a. Prime Coat: Primer, epoxy, as recommended in writing by topcoat manufacturer.
b. Intermediate Coat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.
c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.

1.10 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Pigmented Polyurethane over Inorganic Zinc-Rich Primer System:

    a. Prime Coat: Primer, zinc-rich, inorganic, MPI #19.
    b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
    c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72.

END OF SECTION 099600

SECTION 101423 – INTERIOR SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Panel signs - 8 x 8 with changeable insert panel
2. Cast-metal dedication plaque

B. Related Sections include the following:
1. Division 10 Section "Signs" for exterior lettering
2. Exterior parking signs are as shown on Site Drawings..

1.2 PANEL SIGNS

A. General: Provide panel signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally.

B. **Available** Manufacturers:
1. System 2/90
2. Allotech, Inc.
3. Innerface Signature system

C. Cast-Acrylic Sheet: Manufacturer's standard and as follows:

1. Color: As selected from Manufacturers standards

D. Framed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to comply with the following requirements:

1. Edge Condition: Square.
2. Corner Condition: Square
3. Edge Frame mechanically fastened to backing panel
4. 8 x 8 module size with changeable message insert below room indicator and room number

E. Tactile and Braille Copy: Copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks, cast integral to sign panel. No surface applied graphics permitted.

1. Panel Material: **Opaque acrylic sheet** .
2. Raised-Copy Thickness: Not less than 1/32 inch (0.8 mm).

1.3 CAST-METAL DEDICATION PLAQUE

A. General: Provide castings free from pits, scale, sand holes, and other defects. Comply with requirements specified for metal, border style, background texture, and finish and in required thickness, size, shape, and copy.

B. **Available** Manufacturers:

1. A.R.K. Ramos.
2. American Graphics Inc.
3. Gemini Incorporated.

C. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

D. Border Style: **Raised flat band**.

E. Background Texture: Manufacturer's standard **pebble texture finish**.

F. Mounting: **Rosettes and fasteners matching plaque finish** for substrates encountered.

1.4 PANEL SIGN TYPES

A. Room Signs - Required for every space in the structure

1. Material: **Cast-acrylic sheet**.
2. Perimeter: **Framed** and mounted with vandalproof fasteners. All mechanically fastened components
3. Copy: **Tactile and Braille** molded into sign face panel
4. Character Style: **Helvetica regular** in sizes as indicated on the drawings
5. Text: **As indicated in the Signage Schedule**.
6. Sizes:
   a. Character and Panel Sizes: as scheduled

7. Colors - as selected by Architect from Manufacturers standards.

B. Dedication Plaque wording to include Owners name, year of completion, General Contractor, and Architect.

END OF SECTION 101423

SECTION 101425 – SIGNS – EXTERIOR

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of signs:

1. Exterior U of U Caduecus/Staff of Asclepius Symbol in large format 8-10' TALL and dimensional letters and numbers on a minimum of two elevations

1.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers include the following:

1. Manufacturers of Dimensional Letters:

a. Andco Industries Corp.
b. ASI Sign Systems, Inc.
c. Metal Arts.

1.3 MATERIALS

A. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of 6063-T5.

1.4 DIMENSIONAL LETTERS AND NUMBERS

A. Cast Letters and Numbers: Form individual letters and numbers by casting. Produce characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into the back of characters and tap to receive threaded mounting studs. Comply with requirements indicated for finish, style, and size.

1. Metal: Aluminum, clear anodized, brushed finish.
2. Letter Height: 24 inches, IN Owner approved font
3. Wording: "UNIVERSITY OF UTAH HEALTHCARE – FARMINGTON CLINIC".

1.5 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

1.6 ALUMINUM FINISHES

A. Cast Aluminum Finish: Finish to be determined; may be custom for some manufacturers.

END OF SECTION 101425

SECTION 102113 - TOILET COMPARTMENTS

1.1 SUMMARY

A. Section Includes:

1. Stainless-steel toilet compartments configured as toilet enclosures and urinal screens.
2. Solid Surface toilet compartments configured as toilet enclosures and urinal screens

1.2 ACTION SUBMITTALS

1.3 MATERIALS

A. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

B. Stainless-Steel Castings: ASTM A 743/A 743M.

C. Solid Surface

1.4 STAINLESS-STEEL UNITS

A. Manufacturers: provide products by one of the following:

1. Accurate Partitions Corporation.
2. All American Metal Corp.
3. American Sanitary Partition Corporation.
4. Ampco, Inc.
5. Bradley Corporation; Mills Partitions.
6. Flush Metal Partition Corp.
7. General Partitions Mfg. Corp.
8. Global Steel Products Corp.
9. Hadrian Manufacturing Inc.

B. Toilet-Enclosure Style: Floor Anchored Overhead braced.

C. Urinal-Screen Style: Wall hung **,** floor supported

D. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.

1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) for doors and panels and 1-1/4 inches (32 mm) for pilasters.
2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.

3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

E. Urinal-Screen Construction:

1. Flat-Panel Urinal Screen: Matching panel construction.

F. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:

1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.038 inch (0.95 mm).
2. Pilasters, Unbraced at One End: Manufacturer's standard thickness, but not less than 0.050 inch (1.27 mm).
3. Panels: Manufacturer's standard thickness, but not less than 0.038 inch (0.95 mm).
4. Doors: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm).
5. Flat-Panel Urinal Screens: Thickness matching the panels.
6. Integral-Flange, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm).

G. Stainless-Steel Finish: **Manufacturer's standard brushed finish** on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

1.5 SOLID SURFACE UNITS

A. Manufacturers:
Bobrick
Privacy Plus™ Euroline Toilet Compartments, Ampco, Inc.
Ultimate Corian® System by Shower Shapes
WilsonArt® Gibraltar® Material.

B. Mounting Brackets

1. Mounting Brackets shall be constructed of stainless steel and shall be mounted inside compartment.
2. Fasteners at locations connecting panels-to-stiles shall utilize through-bolted, stainless steel, pin-in-head Torx sex bolt fasteners. Through-bolted fasteners shall withstand direct pull force exceeding 1,500 lbs. per fastener.
3. Wall mounted urinal screen brackets shall be 11 gauge (3 mm) double thickness.

1.5 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Stainless steel.
2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position.
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.

4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.

C. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

D. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

1.6 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as

END OF SECTION 102113

SECTION 102226 - OPERABLE PANEL PARTITIONS

1.1 SUMMARY

A. This Section includes the following:

1. Manually operated, panel partitions. STC 50 RATING with washable vinyl facing.

1.2 SUBMITTALS

A. Shop Drawings

B. Product Data

C. Facing Samples

1.3 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Panel-Face Finish Material: Furnish full-width in quantity to cover both sides of two panels when installed.

1.4 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Design Standard: Modernfold, Inc.
   Acoustiseal 941 with steel trolleys

2. Panelfold, Inc.

1.5 MATERIALS

A. Steel Frame: Steel sheet, not less than **0.0478-inch (1.2-mm)** nominal specified thickness for uncoated steel.

1 Frame Reinforcing: Manufacturer's standard

B. Steel Face/Liner Sheets: Tension-leveled steel sheet, not less than **0.0299-inch (0.75-mm)** nominal specified thickness for uncoated steel.

C. Gypsum Board Facing Panels: ½ inch thick Gypsum Board Class A rated

1.6 PANELS

A Panel Construction: Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

1. Steel-Frame Panel Construction: Faced with steel sheet and gypsum board or perforated steel sheet and gypsum board to meet STC requirements
2 Panel Weight-**12 lb/sq ft**
3 Panel Thickness: Not less than 4 **inches nominal**

B. Cap-Trimmed Edges: Protective aluminum perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing.

C. Trim: Manufacturer's standard aluminum trim, finished as follow.

Clear anodized, manufacturer's standard.

D. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.

1.7 SEALS

A. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended, closed, and in place.

1. Initial Closure: **Flexible, resilient PVC, bulb-shaped acoustical seal**.

2. Final Closure: **Flexible, resilient PVC, bulb-shaped acoustical seal**.

B. .Vertical Seals: Deep-nesting, interlocking astragals mounted on each edge of panel, with continuous PVC acoustical seal.

C. Horizontal Top Seals: as standard with manufacturer to comply with STC requirements exerting uniform constant pressure on track when extended.

D. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

Mechanically or Automatically Operated as standard with manufacturer

1.8 FINISH FACING

A. General: Provide finish facings that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.

1. Apply one-piece, seamless facings free from air bubbles, wrinkles, blisters, and other defects with no gaps or overlaps. Horizontal butted edges or seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.

   Where facings with directional or repeating patterns or directional weave, repeating, or matching grain are indicated, mark facing top and attach facing in same direction.

Fabric Wall Covering: **Manufacturer's standard washable vinyl faced fabric** from same dye lot, treated to resist stains

1.9 SUSPENSION SYSTEM

A. Suspension Tracks: Steel or aluminum with adjustable steel hanger rods for overhead support, designed for type of operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.5 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Panel Guide: Aluminum; finished with factory-applied, decorative, protective finish.
2. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

C. Track Intersections, Switches, and Accessories: As required for type of operation, storage, track configuration, and layout indicated for operable panel partition, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.

1, Curve-and-Diverter Switches: Allowing radius turns to divert panels to an auxiliary track.
2. L Intersections: Allowing 90-degree change in travel direction of panels
3. Center carrier stop.

D. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish, unless otherwise indicated.

E. Steel Finish: Factory-applied, corrosion-resistant, protective coating, unless otherwise indicated.

1.9 ACCESSORIES

A. Storage Pocket Doors: Double leaf doors, Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware. Hinges in finish to match other exposed hardware.

END OF SECTION

SECTION 102600 - WALL AND DOOR PROTECTION

1.1 SUMMARY

A. This Section includes the following

1. Corner guards to be installed at outside corners of partitions in all areas.
2. Impact-resistant wall coverings.

1.2 SUBMITTALS

A. LEED Submittals:

1. Credits MR 4.1 and 4.2: For products having recycled content, manufacturer's documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

   a. Include statement indicating cost for each product containing steel.

2. Credit MR 5.1 and 5.2: Submit the locations of manufacturing and harvest, extraction or recovery for all products manufactured within 500 miles that also contain raw materials harvested, extracted or recovered within 500 miles. Submit distances in miles, as the crow flies, from the harvest/extraction/recovery site and from the manufacturing site to the Project.

   a. Submit cut sheet and/or letter from manufacturer verifying locations.
   b. Include statement indicating cost for each material and the fraction by weight that is considered regional.

3. Credit MR 7: Invoices for permanently-installed wood products must conform to the requirements noted in Section 018113 "Sustainable Design Requirements".

4. Credit IEQ 4.1: Product data for adhesives and sealants applied on site and located inside the weatherproofing system, indicating VOC content of each product used.
5. Product Data for Credit EQ 4.4: For composite wood products, documentation indicating that products contain no urea formaldehyde.

1.3 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, 4-foot- (1.2-m-) long units.

B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

1.4 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide impact-resistant wall protection system products by one of the following:

1. Arden Architectural Specialties, Inc.
2. Balco, Inc.
3. Construction Specialties.
4. IPC Door and Wall Protection Systems, Inc.
5. Pawling corporation
6. Wilkinson Company, Inc.

1.5 MATERIALS

A. PVC-Free Thermoplastic: Class 1, chemical- and stain-resistant, high-impact-resistant PVC-free thermoplastic with integral color throughout; extruded and sheet material, thickness as indicated. Thermoplastic with no PBT's (persistent bioacccumulative toxins), BPA (bisphenol A) or halogenated fire-retardants.

1. Impact Resistance: Minimum 25.4 ft-lbf/in. (1356 J/m) of notch when tested according to ASTM D 256, Test Method A.
2. Chemical and Stain Resistance: Tested according to ASTM D 1308.
3. Self-extinguishing when tested according to ASTM D 635.
4. Flame-Spread Index: 25 or less.
5. Smoke-Developed Index: 450 or less.

B. PETG (PVC-Free) Rigid Sheet: Class A/1, abrasion resistant; with a minimum impact-resistance rating of 13 ft.-lbs./in. when tested according to ASTM D 256.

C. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated, but with not less than strength and durability properties specified in ASTM B 221 (ASTM B 221M) for Alloy 6063-T5.

D. Stainless-Steel Plate: Type 304, minimum 0.0625 inch (1.6 mm).

E. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

F. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.6 CORNER GUARDS

A. Surface-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Construction Specialties Acrovyn 4000 Model SSM-20N or comparable product by one of the following:

a. American Floor Products Co., Inc.
b. Arden Architectural Specialties, Inc.

c. Balco, Inc.
d. Construction Specialties, Inc.
e. IPC Door and Wall Protection Systems; Division of InPro Corporation.
f. Musson Rubber Company.
g. Pawling Corporation.
h. Tepromark International, Inc.
i. WallGuard.com.

2. Cover: Extruded rigid plastic, minimum 0.078-inch (2.0-mm) thickness; as follows:

a. Profile: Nominal 2-inch- (50-mm-) long leg and 1/4-inch (6-mm) corner radius.
b. Height: As indicated.
c. Color and Texture: As indicated.

3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum.
4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

B. Stainless-Steel Corner Guards (Service Areas): Paper-covered, satin-finish, 0.0625-inch (1.6-mm) minimum, stainless-steel sheet corner guards. Provide 90-degree turn, unless otherwise indicated; and formed edges.

1. Wing Size: 3-1/2 by 3-1/2 inches.
2. Height: As indicated.
3. Mounting Method: Flat-head, countersunk screws through factory-drilled mounting holes.
4. Corner Radius: 1/8 inch (3.2 mm).

1.7 IMPACT-RESISTANT WALL COVERINGS

A. Impact-Resistant Sheet Wall Covering: Fabricated from plastic sheet wall-covering material.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Construction Specialties Acrovyn 4000 0.060-inch Rigid Sheet or comparable product by one of the following:

a. American Floor Products Co., Inc.
b. Arden Architectural Specialties, Inc.
c. Balco, Inc.
d. Construction Specialties, Inc.
e. IPC Door and Wall Protection Systems; Division of InPro Corporation.
f. Kwalu, LLC.
g. Pawling Corporation.
h. Tepromark International, Inc.
i. WallGuard.com.

2. Size: 48 by 96 inches (1219 by 2438 mm) for sheet.
3. Sheet Thickness: 0.060 inch (1.5 mm).
4. Color and Texture: As indicated.
5. Height: As indicated.
6. Trim and Joint Moldings: Extruded rigid plastic that matches sheet wall covering color.
7. Mounting: Adhesive.

END OF SECTION 102600

SECTION 104413 - FIRE-PROTECTION SPECIALTIES

1.1 SUMMARY

A. This Section includes the following:
   1. Fire-protection cabinets for portable fire extinguishers.

1.2 MANUFACTURERS

1. Fire-Protection Cabinets:

   a. J.L. Industries, Inc.
   b. Larsen's Manufacturing Company.
   c. Potter-Roemer; Div. of Smith Industries, Inc.

1.3 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

   1. Sheet: ASTM B 209 (ASTM B 209M).

1.4 FIRE-PROTECTION CABINETS

A. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.

   1. Cabinet Metal: Aluminum sheet.

B. Cabinet Mounting: Suitable for the following mounting conditions as scheduled or shown on drawings

   1. Semirecessed: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated.

   2. Rated and Non-Rated

C. Cabinet Trim Style: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

   1. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

      a. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.

D. Cabinet Trim Material: Manufacturer's standard, as follows:

1. Aluminum sheet.

E. Door Material: Manufacturer's standard, as follows:

1. Aluminum sheet.

F. Glazing: Impact resistant as standard with manufacturer.

1. Glass: Clear float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm, single strength.

G. Door Style: Manufacturer's standard design, as follows:

1. Vertical duo panel with frame. Lockable with pressure release latch.

H. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.

1. Provide minimum 1/2-inch- (13-mm-) thick door frames, fabricated with tubular stiles and rails, and hollow-metal design.
2. Provide inside latch and lock that releases under pressure

I. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

J. Door Locks: Provide cylinder lock, with all cabinets keyed alike.

K. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.
1. Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER" applied to door.
   a. Application Process: Vinyl letters.
   b. Lettering Color: Red.
   c. Orientation: Vertical.

1.5 ALUMINUM FINISHES

A. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

1.1 SUMMARY

A. Section includes portable fire extinguishers. UL Rated A .

1.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet indicated.

1. Manufacturers:

   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. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, with sodium bicarbonate based dry chemical in enameled-steel container.

1.3 INSTALLATION

A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

SECTION 105113 – METAL LOCKERS

1.1 SUMMARY

A. This Section includes the following:

1. Single Tier Wardrobe lockers

1.2 MANUFACTURERS

1. ASI Storage solutions; Traditional Collection
2. General Storage Systems Décor Tri-Lok
3. Lyon Metal Products Inc. Standard Lockers
4. Penco Products. Guardian Lockers
5. Republic Storage Systems Co., Inc. Quiet Lockers

1.3 MATERIALS

A. Steel Sheet: ASTM A 366 (A 366M), commercial-quality, stretcher-leveled, cold-rolled carbon steel sheet, stretcher leveled, free of buckling, scale, and surface imperfections.

B. Fasteners: Zinc- or nickel-plated steel; slotless-type exposed bolt heads; self-locking nuts or lock washers for nuts on moving parts.

C. Equipment: Manufacturer's standard plated steel hooks or coat rods.

1.4 WARDROBE LOCKERS

A. Body: Form backs, tops, bottoms, sides, and intermediate partitions of flanged 0.0276-inch 24 gauge minimum steel sheet.

1. Form exposed ends of nonrecessed lockers of 0.0635-inch 16 gauge minimum steel sheet.

B. Frames: Form channel frames of 0.0635-inch (1.5-mm) minimum steel sheet. Form continuous integral strike on vertical frame members or weld 0.0897-inch (2.3-mm) minimum latch hooks to latch strike frame.

C. Shelf: Form shelf of 0.0276-inch 24 gauge minimum steel sheet..

D. Door: One-piece steel sheet, flanged at all edges, constructed to prevent springing when opening or closing. Fabricate to swing 180 degrees.

1. Thickness: 0.0785 inch 14 gauge minimum. (Heavy Duty corridor Lockers)

E. Reinforcing Panels: Brace or reinforce inner face of doors with manufacturer's standard reinforcing angles, channels, or stiffener panels.

F. Hinges: Steel, continuous

G Cylinder Locks: Built-in Flush cam lock with 5 pin tumblers, keyed separately and master keyed.

H. Bolt Operation: **automatically locking spring bolt**. “Slam Latching”

I. Locker Sizes:

1. Lockers : 12"W x 15"D x 36"H; double-tier.
2. Continuous sloped top at those lockers not installed in recess.

J Handicapped Accessible Lockers: Provide 1 accessible locker dimensioned to accommodate usage from wheel chair height, and to comply with ADA requirements.

1. Mount shelf 9 inches above finished floor. Add ADA symbol to door face and locate at ends of run to allow unencumbered wheelchair access.

1.5 LOCKER ACCESSORIES

A. Equipment: Furnish each locker with the following items, unless otherwise shown:

1. Double-Tier Units: 1 double-prong ceiling hook, and not fewer than 2 single-prong wall hooks. Secure ceiling hooks to underside of hat shelf for standard units..

B. Number Plates: Manufacturer's standard etched, embossed, or stamped, nonferrous-metal number plates with numerals not less than 3/8 inch (9 mm) high. Number lockers in sequence indicated. Attach plates to each locker door, near top, centered, with at least 2 fasteners of same finish as number plate.

C. Continuously Sloping Tops: Manufacturer's standard continuously sloped top, not less than 0.0396-inch 20 gauge steel sheet. Provide closures at ends and sloped corner fillers.

D. Continuous Metal Base: Minimum 0.0598-inch- (1.50-mm-) thick steel sheet, channel or zee profiled for stiffness, fabricated in lengths as long as practicable to enclose base and base ends of lockers, and finished to match lockers. (At limited areas only)

1) Height: 4 inches (102 mm).

E Recess Trim: Manufacturer's standard 0.0516-inch 18 gauge minimum steel sheet trim with concealed fastening clips.

F Filler Panels: 0.0516-inch minimum steel sheet, factory fabricated and finished to match lockers.

G Finished End Panels: Manufacturer's standard 0.0276-inch 24 gauge minimum steel sheet end-finishing panels to conceal exposed ends of nonrecessed lockers.

1.6 STEEL SHEET FINISHES

A. Manufacturers standard Baked-Enamel or Powder coat Finish:

1. Color and Gloss: As selected by Architect.

END OF SECTION 105113

SECTION 107500 – FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Ground-set aluminum flagpole; 30’ high.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide flagpoles capable of withstanding the effects of wind loads as determined according to the building code in effect for this Project or NAAMM FP 1001, "Guide Specifications for Design Loads of Metal Flagpoles," whichever is more stringent.

1. Base flagpole design on maximum standard-size flag suitable for use with pole or flag size indicated, whichever is more stringent.
2. Basic Wind Speed: For Project location, 100 mph (45 m/s).

1.3 MANUFACTURERS

1. Baartol Co., Inc.
2. Concord Industries, Inc.
3. Eder Flag Manufacturing Co., Inc.
4. Ewing: John Ewing & Co. Inc.
5. ICC Manufacturing Co.; Morgan-Francis Div.; AABEC Pole Div.
6. Kearney-National Inc.; American Flagpole Div.
7. Lingo, Inc.; Acme Flagpole Co. Div.
8. Michigan Flagpole Inc.
9. Olympus Flag & Banner; EMC Div.
10. PLP Composite Technologies, Inc.
11. Pole-Tech Co., Inc.

1.4 FLAGPOLES

A. Aluminum Flagpoles: Fabricate from seamless, extruded tubing complying with ASTM B 241 (ASTM B 241M), alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm). Heat treat after fabrication to comply with ASTM B 597, temper T6.

1. Provide cone-tapered aluminum flagpole.

B. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.0635-inch (1.6-mm) minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

1.5 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match pole-butt diameter.

1. 0.063-inch (1.6-mm) spun aluminum, bronze anodized finished.

B. Internal Halyard System: Furnish pole with internal halyard system consisting of a manually operated, geared winch with control stop device and removable handle. Provide stainless steel braided aircraft-type cable and concealed revolving truck assembly with plastic-coated counter balance and sling. Provide reinforced, flush access door, secured with cylinder lock.

C. Provide four snaps per halyard.

1.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Aluminum: Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
1. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

1.7 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Cover top of foundation tube with concrete. Cover with flashing collar.

END OF SECTION 107500

SECTION 111300 - LOADING DOCK EQUIPMENT

1.1 SUMMARY

A. Section Includes:

1. Dock levelers with integral dock bumpers
2. Dock seals to comply with 2012 IECC.
3. Light Communication systems.

B. Warranty: Dock Levelers:

1. Structural Assembly: **10** years.
2. Hydraulic System: **Five** years.

1.2 MAINTENANCE SERVICE

A. Full-Maintenance Service: 12 months.

1.3 PRODUCTS

A. Recessed Dock Levelers: MH 30.1

1. Rated Capacity: 15,000 lb.
2. Platform Size: <**Insert size**>.
3. Frame: **Clean-pit** type.
4. Toe-Guard Range: Entire upper **operating** range.
5. Automatic Compensation: **Vertical and lateral**.
6. Length of Lip Extension: **20 inches with 12 inches minimum beyond face of dock bumper.**
7. Interlock: To **overhead door**.
8. Operation: **Hydraulic**.
9. Integral Molded-Rubber Dock Bumpers: **6 inches (152 mm)** thick.
10. Accessories:

    a. Curb angles.
    b. Self-forming pan.
    c. Night locks.
    d. Side and rear weatherseals.
    e. **Smooth** surface.

11. Finish: **Painted**.

B. Light Communication Systems.

1. Manufacturers: :

    a. Beacon Industries, Inc.
    b. Nordock Inc.
    c. Rite-Hite Corporation.
    d. SPX Dock Products - Kelley.

e. SPX Dock Products - Serco.
f. Vestil Manufacturing Company.

2. Exterior Sign Copy in Forward and Reverse Text: **Manufacturer's standard text permitting truck movement with green light**
3. Signal-Light Sets: Red and green illuminated signal-light sets, with lens approximately 4 inches (102 mm) in diameter, designed to indicate status to both dock attendant and truck driver. Equip system with steel control panel that includes illuminated lights indicating status of exterior signal lights; located at interior of dock. Provide signal-light set and control panel at each location indicated for light-communication system. Enclose signal lights in steel or plastic housing, with exterior signal-light sets equipped with sunshade.
4. Automatic Operation: Lights are activated automatically by **limit switch or photoelectric sensor** mounted on overhead door track. Provide on-off switch located on control panel.

C. Foam Pad Dock Seals consisting of fabric-covered foam pads designed to compress 4 to 5 inches (102 to 127 mm) under pressure of truck body to form an airtight seal at jambs and head of loading dock openings; of type, size, and construction indicated.

Manufacturers:
a. Blue Giant Equipment Corporation.
b. Rite-Hite Corporation.
c. Super Seal Mfg. Ltd.

1. Stationary Head Pad: 18 inches (457 mm) high and same depth as jamb pads; sized for opening width
2. Jamb Pads: Square.

3. Nominal Size: 12 inches (305 mm) wide and sized for opening height.
4. Constructed of single- or double-ply, coated, fabric-covered, urethane-foam core with supporting frame. Fabricate jamb and head pads of same depth and sized for opening width.
5. Steel Support Frame: Steel channel frame of manufacturer's standard weight, shape, and finish; with steel mounting hardware.
6. Cover Fabric: Hypalon-coated nylon with minimum total weight of 40 oz./sq. yd. (1356 g/sq. m).

   a. Color: As selected by Architect from manufacturer's full range.

7. Guide Strips: 4-inch- (102-mm-) wide, coated, nylon guide strips on jamb pads.
8. Pleated Protectors: On face of jamb pads of overlapping layers of coated fabric attached to base fabric; 8-inch (203-mm) wear exposure.

END OF SECTION 111300

SECTION 122413 - ROLLER WINDOW SHADES

1.1 SUMMARY

A. Section Includes:

1. Double Roller shades motor operated and manual operation.
2. Manual Single Roller shades

1.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Draper Inc.
2. Hunter Douglas Contract.
3. Lutron Electronics Co., Inc.
4. MechoShade Systems, Inc.
5. Silent Gliss USA, Inc.

1.3 OPERATORS

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Manufacturer's standard Nickel-plated or Stainless steel.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.

B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of inside face of shade.
2. Direction of Shadeband Roll: Regular, from back of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated. Mount headbox to vertical curtain wall mullions with concealed bracket.

D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

1.4 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Shadebands:

1. Shadeband Material: Light-filtering fabric.
2. Shadeband Bottom (Hem) Bar: Steel.

1.5 SHADES WITH DOUBLE ROLLERS - MANUAL AND MOTOR OPERATED

A. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

B. Outside Shadebands:

1. Shadeband Material: Light-filtering fabric.
2. Shadeband Bottom (Hem) Bar: Steel.
   - Type: Enclosed in sealed pocket of shadeband material. Dark side of fabric shall be folded to interior to create pocket.

C. Inside Shadebands:

1. Shadeband Material: Light-blocking fabric.
2. Shadeband Bottom (Hem) Bar: Steel

D. Installation Accessories:

1. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

E. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

1. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:

2. Group Control Station: Maintained-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for single-switch group control.

3. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
4. Limit Switches: Adjustable switches, interlocked with motor controls and set to stop shade movement automatically at fully raised and fully lowered positions.
5. Operating Features:

1.6 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Type: Woven PVC-coated fiberglass.
2. Roll Width: 98 inches.
3. Openness Factor: 1 percent.

C. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.

1. Type: PVC-coated fiberglass with bonded PVC film.
2. Roll Width: 72 inches (1829 mm).

END OF SECTION

SECTION 129300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Seating.
2. Bicycle racks.
3. Trash receptacles.
4. Bollards.

1.3 MANUFACTURER

A. Owners Design Standards are based upon products as manufactured by Landscape Forms, Inc.,
Subject to compliance with requirements, products of other manufacturers may be incorporated into the work, where acceptable to Owner.

1.3 FINISHES

A Typical Finishes: Topcoat; Thermosetting TGIC polyester powder coat. UV, chip, and flake resistant.”.

- Gloss Consistency, Gardner 60 Degrees, ASTM D 523: Plus or minus 5 percent from standard.
- UV Resistance, Color and Gloss, ASTM G 155, Cycle 7: Delta E less than 2 at 2.0 mils and less than 20 percent loss.
- Cross-Hatch Adhesion, ASTM D 3359, Method B: 100 percent pass.
- Flexibility Test, Mandrel, ASTM D 522: 3 mm at 2 mils.
- Erichsen Cupping, ISO 1520: 8 mm.
- Impression Hardness, Buchholz, ISO 2815: 95.
- Impact Test, ASTM D 2794: 60 inch-pounds at 2.5 mils.
- Pencil Hardness, ASTM D 3363: 2H minimum.
- Corrosion Resistance, 1,500-Hour Test, ASTM B 117: Max. undercutting 1 mm.
- Humidity Resistance, 1,500-Hour Test, ASTM D 2247: Max. blisters 1 mm.
- Color: Bronze

1.4 COMPONENTS

A SEATING-BENCHES

1. Backless

Depth, 21 inches
Length, 80 inches

2. Backed
- Depth, 26.5 inches
- Length, 80 inches

3. Mounting
- Surface Mount

Materials

4. Seat Back and Panels
- Wood: Molded face, interior seat boards, and seat board en caps; with eased edges.
- Exterior Use: Exotic Solid stock, select hardwood.
- Finish: Unfinished.

5. Frame, Legs and Arms
- Supports: cast aluminum

B. BICYCLE RACKS

1. Size
- Height: 26 inches
- Length: 28 inches
- surface mount

2. Materials
Frame: Aluminum Casting
Adjustable Leveler: Stainless steel round bar
Anchor Cover: Aluminum Casting –

C. TRASH RECEPTACLES

1.Litter Receptacle, with Ash Pan.
Capacity: 23 gallons.

D. BOLLARDS

Style:
1. Base: 11.2 inches x 11.2 inches across the corners.
2. Height:
   a) Dome Top: 43 inches.
3. Embedded.

8. Top Mount Bracket: 7ga HRPO formed steel, magni-coated.

END OF SECTION 129300

SECTION 134900 – RADIATION PROTECTION

1.1 SUMMARY

A. Section Includes:
   1. Lead sheet, strip, and plate.
   2. Lead glass.
   3. Lead-lined building materials and products including the following:
      a. Gypsum board.
   4. Informational signs.

1.2 DEFINITIONS

A. Lead Equivalence: The thickness of lead that provides the same attenuation (reduction of radiation pass- ing through) as the material in question under the specified conditions.

   1. Lead equivalence specified for materials used in diagnostic x-ray rooms is as measured at 100 kV,

1.3 PERFORMANCE REQUIREMENTS

A. Lead-Lined Assemblies: Provide lead thickness in doors, door frames, borrowed lites, penetration shielding, joint strips, film transfer cabinets, and other items located in lead-lined assemblies not less than that indicated for assemblies in which they are installed.

B. Lead Glazing: Unless otherwise indicated, provide lead equivalence not less than that indicated for assembly in which glazing is installed.

1.4 MATERIALS

A. Lead Sheet, Strip, and Plate: ASTM B 749, alloy UNS No. L51121 (chemical-copper lead).

B. Lead Glass: Lead-barium, polished float glass containing not less than 60 percent heavy metal oxides, in- cluding not less than 48 percent lead oxide by weight.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the follow- ing:

      a. Amerope Enterprises, Inc.
      b. McGrory Glass, Inc.
      c. Schott North America, Inc.

C. Lead-Lined Gypsum Board: 5/8-inch (15.9-mm-), Type X thick gypsum board complying with Division 09 Section "Gypsum Board" of width and length required for support spacing and to prevent cracking during handling, and with a single sheet of lead laminated to the back of the board.

   1. For rated lead-lined partitions provide lead-lined gypsum board required by referenced U.L. De- sign.
   2. Provide lead sheet lining the full width of board and length necessary to extend from floor to 84 inches (2133 mm) above floor.
   3. Provide 3-inch (75-mm-) wide lead strips for wrapping metal stud flanges.
   4. Provide 2-inch (50-mm-) wide lead strips for backing joints.

D. Accessories and Fasteners: Provide manufacturer's standard fasteners and accessories as required for to maintain lead equivalence of system.

1.5 INSTALLATION OF PENETRATING ITEMS

A. At penetrations of lead linings, provide lead shields to maintain continuity of protection.

B. Provide lead linings, sleeves, shields, and other protection in thickness not less than that required in as- sembly being penetrated.

C. Secure shields at penetrations using adhesive or wire ties, but not penetrating fasteners, unless indicated on Drawings.

D. Outlet Boxes and Conduit: Cover or line with lead sheet lapped over adjacent lead lining at least 1 inch (25 mm).

END OF SECTION 134900

SECTION134925 – RF SHIELDED ENCLOSURE

1.1 SUMMARY

A. This Section Includes the Following:

1. Complete assembly consisting of all labor, materials, equipment, tools and all related items to engineer, fabricate, install and place into service Radio Frequency (RF) shielding for a MRI Exam Room . (RF shielded enclosure is to be provided by a qualified RF Shielding Contractor hired by the General Contractor;

2. Coordination with RF Shielding Contractor, MRI provider , the General Contractor and subcontractors is required as work of this Section.

3. The General Contractor shall provide a concrete structure, level and plumb within 1/4 inch maximum tolerance over any 10-foot section of the wall or slab..

1.2 PERFORMANCE REQUIREMENTS:

A. The function of the shielded enclosure is to provide a highly conductive medium that will attenuate externally generated electromagnetic energy to a level acceptable for proper operation of the installed MRI Imaging System. The installed enclosure shall, provide functional EMI attenuation to the decibel ratings as recommended by the supplier.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following codes and standards:

1. MIL-STD-285 - (as modified for MRI testing) Method of Attenuation Measurements for Electro-magnetic Shielding Enclosures for Electrical Test Purposes
2. MIL-STD-220-A Method of Insertion Loss Measurements for Radio Frequency Power Line Filters

B. Manufacturer Qualifications:

1. The successful manufacturer is to have been engaged in the manufacture and installation of Radio Frequency Shielded Enclosures of a like size and complexity of that required for this project for a period of not less than eight (8) years.

C. Use of Dissimilar Materials:

1. Use of the following in manufacture and installation of shielded enclosure <u>shall not be permitted.</u>

   a. Dissimilar metals that exhibit an anodic voltage differential greater than 0.25 volts.
   b. Copper or aluminum in direct contact with bare concrete.
   c. Zinc plated RF framing in direct contact with copper RF medium.
   d. Copper plated steel or brass RF framing in direct contact with galvanized steel.

2. Use of the following in manufacture and installation of shielded enclosure shall be permitted.

a. Bronze or brass flame spray treatment of steel or aluminum RF contact surfaces.

3. Construct shielding system with proper materials so that ionic conduction across joints and RF seams shall be less than 0.10 volts.

1.4 WARRANTY

A. The basic enclosure shall be warranted against defects in the materials and/or workmanship and to retain the specified RF shielding characteristics for a period of five (5) years from the date of the RF acceptance test.

1.5 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Braden Shielding Systems
2. IMEDCO,
3. ETS-Lindgren,

1.6 SHIELD DESIGN

A. Provide a properly designed enclosure that attenuates a radiated EMI field by the level stated within this section. These requirements shall be accomplished in conformance with the specified materials.

1.7 MATERIALS

A. RF Shielded Floor Systems: Provide RF shielded flooring within the entire area of MRI Exam Room (inclusive of any depicted cable trenching designed flush with the finished floor).

1. Electrical isolation of the enclosure and the RF floor system shall be achieved with the use of a two part, thermosetting resin applied directly to the parent supporting floor structure. The use of pressed wood materials is not allowed for use as an electrical Isolation material.
2. Moisture sealing of the parent concrete floor shall be accomplished by the thermosetting resin acceptable to enclosure manufacturer. The use of plastic sheet overlay applied in sections and taped into a moisture/vapor barrier is not allowed.

B. Primary Enclosure:

1. The primary enclosure is comprised of the vertical walls and ceiling made integrally with the RF floor system.

C. RF Shielded Patient Entry Door:

1. The RF shielded door system shall be visually similar to building standard interior doors and shall use utilize conventional hospital quality hardware to match building standard in appearance only with ferromagnetic components prohibited

D. RF Shielded Patient View Window:

1. The RF shielded view window assembly shall be constructed utilizing an aluminum extrusion of an engineered shape to affix the RF attenuating screens and provide a means of securing double sided glazing. The contact surface of the extrusion shall be specially treated with brass flame spray.

2. The visible area of the RF screens shall be stained pure black in color for optimum image visibility.

E. Heating Ventilation and Air Conditioning:

1. HVAC supply and return air vents shall be of the wave guide below cutoff type.

F. Cryogenic Gas Exhaust Wave Guide Vent:

1. Shall be a wave-guide below cutoff type.

G. Mechanical Pipe Penetrations:

1. All mechanical pipe penetrations shall be of the wave-guide below cutoff type.

H. Medical Gas Piping Systems: Provide medical gas panel complying with NFPA99C. The use of threaded fittings with dielectric connectors shall be prohibited.

END OF SECTION 134925

SECTION 142100 - ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Traction elevators as follows:

1. Gearless Machine Room Less (MRL) Passenger Elevators, Car Nos. 1, 2,3
2. Provisions for card Reader access

B. Products Installed But Not Furnished Under This Section:

1. Elevator related security devices, control unit, mounting brackets, wiring materials, logic circuits, security system interface terminals, boxes and relays

1.2 MAINTENANCE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall consist of twelve months full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance during normal working hours.
2. Perform emergency callback service during normal working hours. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of sixty minutes or less.
3. Construction contract will include initial maintenance service beginning at Substantial Completion. General Contractor cannot deduct. Work shall be in accordance with Owners standard maintenance agreement form.

B. Continuing Maintenance Service: The elevator system shall be maintainable by any licensed elevator maintenance company employing journeymen mechanics, without the need to purchase or lease additional diagnostic devices, special tools, or instruction from the original equipment manufacturer.

1.3 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. KONE Inc.
2. Otis Elevator Co.
3. Schindler Elevator Corp.
4. ThyssenKrupp Elevator.

1.4 ELEVATORS

A. Elevator manufacturer and subcontractor must meet design conditions and parameters as shown in the contract documents. Any adjustments from manufacturers' standards products needed to meet the requirements of the project are the responsibility of the elevator manufacturer and sub-contractor.

B. Gearless Machine Room Less (MRL) Passenger Elevators Description:

1. Elevator Identification:

   a. Car Nos. 1.,2,3

2. Capacity: 3500 lbs.
3. Vertical Travel:

   a. 42'-0". 3 FLOORS

4. Class of Loading: Class A.
5. Contract Speed: 350 fpm.
6. Roping: Manufacturer's standard.
7. Machine: Gearless.
8. Machine Location: Overhead machine room less.
9. Supervisory Control: Group automatic.
10. Stops: 5 Front.
    Minimum Clear Inside Dimensions: : 5'-5" x 6'-8".
11. Clear Height Under Suspended Ceiling: 8'-0".
12. Entrance Size: 3'-6" wide x 7'-0" high.
13. Entrance Type: Center-Opening.
14. Door Operation: High speed, heavy-duty door operator. Minimum opening speed: 2½ fps.
15. Door Protection: Infrared full screen device with differential timing, nudging, and interrupted beam time.
16. Safety: Flexible guide clamp-type B, car.
17. Guide Rails: Planed steel tees.
18. Buffers: Oil.
19. Compensation: If Required.
20. Car Enclosure:

    a. As specified, w/swing returns or hinged face plate on car station.
    b. Steel shell as specified plus car interior finishes provided under this section.

21. Signal Fixtures: LED illumination. Custom design.

    a. Hall and Car Pushbutton Stations:

       1) Dual hall pushbutton risers.
       2) Single car operating panel.

    b. Car Position Indicators:

       1) Multi-light in car station with car direction arrows.
       2) Firefighters' control panel.

    c. Hall lanterns/hall position indicator combination fixtures digital type with LED screen at all floors with volume adjustable electronic chime or tone.

d. Car Position Indicator:

1) Digital in car station with car direction arrows.

22. Additional Features:

a. Standby Power
b. Standby Pwereed lowering
c. Seismivc Emergency Operation
d. Hoistway access switches, top and bottom floors.
e. Hoistway door unlocking device, all floors.
f. Sill support angles.
g. Seismic devices and operation.
h. Monitoring system provision for future lift net system.
i. System diagnostic means and instructions.

23. Security features: Card Reader

25 Provide hooks for protective pads **in all cars** and **one** complete set(s) of full-height protective pads per car

C. Steel:

1. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
2. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
3. Structural Steel Shapes and Plates: ASTM A36.

D. Stainless Steel: Type 304 complying with ASTM A240, with standard tempers and hardness required for fabrication, strength, and durability. Apply mechanical finish on fabricated work in the locations shown or specified, Federal Standard and NAAMM nomenclature, with texture and reflectivity required to match Architect's sample. Protect with adhesive paper covering.

1. No. 4 Satin: Directional polish finish. Graining directions as shown or, if not shown, in longest dimension.
2. Textured: Provide 5WL as manufactured by Rigidized Metals or Windsor pattern 5-SM as manufactured by Rimex Metals .050 inches mean pattern depth with bright directional polish (No. 4 satin finish).
3. Burnished: Non-directional, random abrasion pattern.
4. Ferrous Stainless Steel: 430 stainless steel at elevator door frames, for use with magnetic smoke containment system.

E. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.

F. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" ±.005" thick, color and texture as follows:

1. Exposed Surfaces Color and Texture: Match Architect's sample.
2. Concealed Surfaces: Contractor's standard color and finish.

G. Fire-Retardant Treated Particle Board Panels: Minimum 3/4" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with Local Authorities for elevator finish materials.

1.5 HOISTWAY AND CONTROL SPACE EQUIPMENT

A. Arrange equipment in spaces shown on drawings.

B. Gearless Traction Hoist Machine:

1. AC induction or P.M.S.M. ACVF gearless traction type motor with brakes, drive sheave, and deflector sheave mounted in proper alignment on a common, isolated bedplate. Provide bedplate blocking to elevate secondary or deflector sheave above machine room support frame, if required.
2. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.

1.6 HOISTWAY ENTRANCES

A. Complete entrances bearing fire labels from a certified testing laboratory approved by authority having jurisdiction. Provide heavy-use/security passenger design.

B. Frames: 430 stainless steel (ferrous stainless steel) at all floors. Bolted and lapped head to jamb assembly at all floors. Provide Arabic floor designation/Braille plates, centered at 60" above finished floor, on both side jambs of all entrances. Provide plates at main egress landing with “Star” designation. For designated emergency car, provide “Star of Life” cast designation plates at height of 78"-84" above finished floor on both side jambs at all floors. Braille indications shall be below Arabic floor designation. Provide cast floor designation/Braille plates as manufactured by SCS or Entrada with permanent rear fasteners.

C. Door Panels: 16 gauge steel, sandwich construction without binder angles. Provide leading edges of center-opening doors with rubber astragals. Provide a minimum of two gibs per panel, one at leading and one at trailing edge with gibs in the sill groove entire length of door travel. Construct door panels with interlocking, stiffening ribs.

D. Sight Guards: 14 gauge, same material and finish as hoistway entrance door panels. Construct without sharp edges.

E. Sills: Extruded aluminum.

END OF SECTION

SECTION 142400- HYDRAULIC ELEVATORS

1.1 SUMMARY

A. This Section includes hydraulic passenger and service elevator
   1. Extensions, attachment brackets, subsill angles and other hardware as required for a complete installation are required as work of this Section.
   2. Card readers are required to limit access.

1.2 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide **12** months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.

   1. Perform maintenance, including emergency callback service, during normal working hours.
   2. Include 24-hour-per-day, 7-day-per-week emergency callback service.

      a. Response Time: Two hours or less.

B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.3 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide hydraulic elevators by one of the following:

   1. Otis

   2. Thyssen Krupp

B. Controllers: **Provide the Owner with any proprietary controller diagnostic equipment that may be required** to communicate with and analyze controller and machinery operations. Instructions and set-up requirements shall be made available for use by others who may be employed by the Owner to monitor elevator operations and maintenance at a later date.

C. Security Features: Provide the following security features, for all elevator cars. Security features shall not affect emergency firefighters' service.

   1. Card-Reader Operation: Provide card readers at pushbutton locations to limit access.

1.4 ELEVATOR CAR ENCLOSURES

A. General: Provide manufacturer's standard **enameled-steel car enclosures with removable wall panels**, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills (thresholds), lighting, and ventilation.

1. Floor finish.
   a. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to 1/2-inch (13-mm) fire-retardant-treated particleboard with **plastic-laminate panel backing complying with NEMA LD 3, Type BKV and** manufacturer's standard protective edge trim. Panels have a flame-spread rating of **25** or less, when tested according to ASTM E 84.
1. Fabricate car with recesses and cutouts for signal equipment.
2. Fabricate car door frame integrally with front wall of car.
3. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel.
4. Ceiling: \stainless steel panels
5. Handrails: Manufacturer's standard handrails, stainless steel.

1.5 HOISTWAY ENTRANCES

A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.

1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.

B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:

1. Stainless-Steel Frames: Formed stainless-steel sheet
2. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel for all door openings
3. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

1.6 ELEVATORS

A. Elevator Design

1. Elevator Number(s): 2
2. Type: Under-the-car single cylinder.
3. Rated Load: 5000 lb (2270 kg)
4. Freight Loading Class for Service Elevators: Class A.
5. Rated Speed: 125 fpm (0.64 m/s)
6. Operation System: Single automatic
7. Auxiliary Operations:

   a. Standby power operation.
   b. Standby-powered lowering.
   c. Battery-powered lowering.
   d. Automatic dispatching of loaded car.
   e. Emergency service at first floor.
   f. Independent service for service elevator.

1. Hoistway Entrances: As follows:

   a. Width: 54 **inches**
   b. Height: **84 inches**
   c. Type: Single speed side slider.

   d. Doors S**atin stainless steel**.
   e. Sills **Aluminum**.

2. Hall Fixtures **Satin stainless steel**.
3. Additional Requirements: As follows:
   a. Provide protective blanket hooks for each car and a complete set of full-height blankets.
   b. Provide emergency generator operation.

4. VERTICAL TRAVEL. _____

END OF SECTION 142400

SECTION 148423 – WINDOW WASHING EQUIPMENT

1.1 SUMMARY

A. This Section includes the following:

Design, supply and installation of window cleaning roof anchors Outriggers and Davit system as required

1.2 DESIGN REQUIREMENTS

A. Design window cleaning/suspended maintenance system to suit building and in accordance with standards, and regulations/codes

B. Locate anchorages with respect to items such as reach, rigging, spacing, roof edge condition, and similar items.

C. Design all anchor components to provide adequate attachment to the building and suited to current window cleaning/suspended maintenance practices. Ensure compatibility with industry standard equipment.

D. Ensure all anchor components conform to proper engineering principles and have been designed by a Professional Engineer qualified in the design of window cleaning, its application and safety requirements.

E. Design system fall arrest safety anchors and equipment supports to comply with the following structural requirements:

1. Fall Arrest Safety Anchors: designed to resist a 5,000 lb. (22.2 kN) load in any direction without detachment or fracture occurring. To avoid deformation under normal usage, anchors are to be generally designed to resist a 1,250 lb. static working load in any direction.

1.3 MANUFACTURER

A. Manufactures offering products that may be incorporated into the work include the following:

PRO-BEL ENTERPRISES LTD.
ROOFTOP ANCHOR INC
SUMMIT ANCHOR COMPANY

B. Other manufactured products meeting this specification may be substituted provided that manufacturers show proof of product insurance. Equipment details to be approved by the Architect. Companies, such as miscellaneous metal fabricators, who are not normally engaged in the design and manufacture of window cleaning/suspended maintenance equipment are not permitted to bid.

1.4 ROOF ANCHORS

A. Safety U-bars: Type 304 stainless steel with yield strength of 35 Ksi (240 MPa). U-bar to be not less than 3/4" (19 mm) diameter material with 2-1/4" eye opening.

B Hollow steel section (HSS) piers: galvanized steel with yield strength of 50 Ksi (350 MPa). Wall thickness to suit application.

C. Base plate and all other sections: galvanized mild steel as above with yield strength of 44 Ksi (300 MPa). Thickness and securement to suit application.

D. Miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 44 Ksi (300 MPa), hot dipped galvanized to ASTM A123 or Type 304 stainless steel with yield strength of 35 Ksi (240 MPa).

1.5 DAVITS.

A. Davit Booms:

1 Roof rigged, aluminum sections of engineered length and size to suit application or as indicated, equipped with carrying handles and designed to carry 1000 lbs (4.5 kN) vertical service load, minimum.

a. Stainless steel rolling trolley on outboard end.

2 Provide non-corrosive UV resistant data plate stating Maximum Service Capacity of boom, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information prominently displayed.

B. Davit Masts: Round tubular section capable of rotating through 360 degree with carrying handles and connecting pins

1. Material: Aluminum.

C. Davit Arms: Davits to be demountable, portable, capable of being easily and quickly broken down into pieces weighing not more than the following:
1 80 lbs (36.3 kg) maximum.
2 Ensure davit arm booms equipped with rolling trolleys or friction trolleys have stops to prevent detachment from boom.
3 Provide hoisting winches and dolly wheels.

D. Davit Bases: Round, mild steel, hollow section piers, Type 350W with 50 Ksi (350 MPa) minimum yield strength.
1 Hot dipped galvanized to ÅSTM A123/A123M]
2 Manufacturer's polyurethane/polyurea coating system.
3 Provide 0.75 inches (19 mm) diameter U-bar safety anchor, and securement to suit application as indicated or required.

4. Pier Height: not less than 10 in. above finished roof surface to allow proper fit up with adaptor.

END OF SECTION

SECTION 149200 - PNEUMATIC TUBE SYSTEM

1.1. DESCRIPTION OF WORK:

A. Furnish all engineering, materials and labor for a complete computer controlled pneumatic tube distribution system.

B. The System shall be a computer controlled pneumatic tube material distribution system, consisting of tubing, stations, transfer units, blower packages, carriers and a control center.

C. The System shall be configured of groups of stations (zones) connected together by interzone tubes. Each station shall be connected to the System by a single tube to a transfer unit.

D. Revit model shall be utilized to avoid conflicts with Structural mechanical plumbing and electrical installations.

1.2. WORK INCLUDED IN THIS SECTION:

A. The Contractor shall furnish and install all motor starters with properly sized thermal overload protection in each phase at the blower packages.

B. The Contractor shall be responsible for general contracting activities associated with the installation of the System as specified in a separate section.

1.3 QUALITY ASSURANCE

A. The Contractor shall provide and install all low voltage control wiring and connections necessary for the proper operation of the System.

B The Contractor shall submit with bid a separate list of 10 hospitals presently using a system equivalent to that specified for transporting blood specimens and other laboratory specimens to include:

Blood specimens for chemistry and hematology analysis,
Arterial blood for blood gas analysis,
Urine specimens for routine analysis and culture,
Cerebral spinal fluid,
Tissues for biopsy, and
Other body fluids.

C. The Contractor shall submit with bid at least one (1) laboratory study verifying that the equivalent system is a soft delivery system which maintains the integrity of sensitive laboratory test parameters to include:

LDH,
Hemoglobin,
Potassium, and
Coagulation Studies (PT, PTT).

D. Submit with bid a list of ten (10) hospitals sending controlled substances.

1.4 SYSTEM DESCRIPTION:

A. The dispatching, routing, and storage of carriers shall be directed by the system control center to provide automatic unattended transmission of carriers between any two stations.

B. The System shall provide shortest route vacuum-pressure travel. Transactions within a zone shall turn around at the nearest transfer unit common to the origin and destination stations.

C. To dispatch a carrier from a station, the operator shall place the latched carrier in the dispatcher, select the destination address and press the "Send" push-button at the station.

D. Systems shall allow multiple carriers to be in transit simultaneously. The System shall allow all station dispatchers to be loaded simultaneously, destinations to be selected and all transactions processed automatically until the System is clear.

E. The System shall consist of 16 stations arranged on zones as coordinated with the tenant.

F. The modular design of the System components shall permit changes in the number of stations and/or zones as Owner requirements change.

G. The System shall provide automatic empty carrier redistribution. The System shall enable operators to dispatch excess empty carriers to carrier-deficient stations which shall be automatically identified and selected by the System. The need shall be determined by the ratio of carriers assigned to carriers present taking into account carriers in transit to the station, carriers queued for dispatch to the station and carriers queued for dispatch from the station.

H. Individual stations or zones shall be able to be shut down without affecting the remainder of System.

I. Destinations which are unavailable (non-existing, full, out-of-service) shall be rejected at the origination station. Prior to dispatch the route to the destination station shall be checked twice to ensure that all sections of the System involved in the transaction are operating properly.

1.5 EQUIPMENT:

A. Line material:

1. Tubing shall be 6” outside diameter, 16 gauge, cold rolled, electric welded steel, flash removed, degreased and hot dip galvanized.

2. Bends shall be formed of same material on a center line radius of not less than 48 inches. The cross-section shall be free from wrinkles and distortions. No expanded bends shall be allowed in the System.

All cut ends shall be square, deburred and mandreled round.

3. Solid steel slip sleeves or split steel gasketed bolted sleeves shall be used for tubing joints. Split sleeves shall be used at all connections of serviceable equipment. All sleeves shall be of the same gage as the tubing.

END OF SECTION

DESIGN CRITERIA AND STANDARDS

The building mechanical, plumbing and fire protection systems will comply with the following codes and design standards:
International Building Code 2012
International Mechanical Code 2012
International Plumbing Code 2012
International Fire Code 2012
International Energy Conservation Code 2012
Utah Boiler Code, January 2012
ASHRAE Standard 62.1-2010
ANSI/ASHRAE/ASHE Standard 170-2008

Design Criteria

Summer Winter
Design Temperatures, Dry bulb 97°F 0°F
Design Temperatures, Wet bulb 64°F -

Indoor Design Conditions:

Summer: 74 °F db maximum
Winter: 70 °F db minimum
Occupancy: 1 person/70 sf
Building weekday operating hours: 5 am – 12 pm Monday through Friday
Building weekend operating hours: 5 am – 12 pm Saturday
Supplemental cooling hours: 24 hours/day, 7 days/week
Lobby cooling hours: 24 hours/day, 7 days/week

Internal Equipment Heat Gains

In addition to occupant and lighting loads, heat gains in all rooms will be based on anticipated equipment to be used in each room with appropriate diversities factors. The following equipment heat gain rates for specific areas are used for load estimates:
Equipment/Electrical/Communication spaces 20 W/sf
General lighting 2 W/sf
General equipment 3 W/sf
Total (lighting + equipment) cooling density 5 W/sf
Office Areas 1 computer, 2 monitors per space, (220 W/office)

Ventilation/Indoor Air Quality

The mechanical system design will comply with ASHRAE Standard 62.1-2010, Ventilation for Acceptable Indoor Air Quality, for minimum ventilation requirements. The outdoor air intake flow and/or space or zone airflow will be reset as operating conditions change. The design will incorporate a ventilation

system that results in an air-change effectiveness greater than or equal to 0.8 as determined by ASHRAE 129-1997.

DIVISION 21 FIRE SUPRESSION

Water Supply:

A Water Flow Analysis Report for the will be required to determine available fire flow at the site.
A Detector check/alarm valve assembly shall be provided at the fire sprinkler system riser to protect the city water supply from contamination. The riser assembly shall meet the requirements of the Utah State Fire Marshal Dept.

Building Fire Protection:

The building shall be protected with a Class I Automatic-Wet, Combined standpipe system.
The Sprinkler system supply and floor control assemblies, shall be coordinated with the smoke control zones. Sprinkler systems shall be supplied from the standpipe system.
Sprinkler system design shall be designed as per Factory Mutual Global Insurance requirements. System design shall be based on FM Global, Property Loss Prevention Data Sheets, 2-8N 2004, which meets and exceeds the requirements of the adopted building standards. Additional FM requirements shall be included as required by the FM Senior Loss Prevention Specialist.

DIVISION 22 PLUMBING

Piping Systems:

1. Building hot water will be piped to reheat terminals throughout the facility via schedule 40 steel or Type K copper pipe.
2. Chilled water will be piped to air handlers throughout the facility via schedule 40 steel or Type K copper pipe.
3. Steam will be piped to humidifiers and process systems throughout the facility via schedule 80 steel pipe.
4. Glycol hot water will be piped to pre-heat coils located in each air handler via schedule 40 steel or Type K copper pipe.
5. Glycol hot water will be piped to snow melt systems throughout the facility via schedule 40 steel or Type K copper pipe.

Plumbing systems

General:

Systems will be designed in compliance with the 2012 IMC and IPC, Local Codes, NFPA and the 2010 Guidelines for Design & Construction of Health Care Facilities.

Outside Utilities:

Design is based on having available utilities (hard water, sewer, natural gas, storm drain) of sufficient capacities to serve this project. All utilities (with the exception of chilled water, steam and soft water) will be brought to the building.

Domestic hot and cold water:

Domestic hot and cold water system will be connected to non-laboratory plumbing fixtures only.
Exception, eye washes and emergency showers will be connected to a tempered water system.
Domestic hot water will be supplied via gas fired instantaneous type hot water heaters.
A recirculation pumping system will be provided.
All domestic hot water will be softened.
The water softeners will be a duplex, automatically alternating system. A water meter will be provided for each softener to measure flow and initiate regeneration cycles. An indoor brine measuring tank will be located along side of the water softeners.

Reverse osmosis water systems:

Laboratory grade water will generated by a RO machine. This system would serve the clean steam and surgery floors only and may be point of use.

Natural gas:

Natural gas system will be connected to the Questar Gas main. A gas meter will be provided at the building. A 5 lb. gas service is desired at the Boiler Plant.

Sanitary sewer and waste system:

A complete sanitary waste and vent system will be provided in accordance with IPC throughout the building. System will be connected to the sewer line.

Storm drainage system:

Complete roof drainage systems will be provided. System design is based on 2" per hour rainfall intensity, 100-year period storm, as listed in the IPC.
Secondary overflow roof drainage will be provided with overflow roof drains and scuppers that will daylight near grade.
Building storm drain system will be run from the building and discharge to the storm sewer.

DIVISION 23 HEATING, VENTILATION AND AIR CONDITIONING

Heating and Cooling Systems

Mechanical Room(s):

Mechanical rooms will be located in a penthouse or within the building and will provide the following services:
1. Chilled water for building cooling.

2. Hot water for building heating.
3. Clean steam for building humidification and sterilizing purposes.
4. A pressure reducing valve station.
5. Domestic cold water for occupant use.
6. Domestic hot water for occupant use.
7. Softened domestic water for occupant use.
8. RO water for sterilizers and humidifiers (centrally distributed system).
9. Fire protection services.
10. A reduced pressure backflow preventer for building use.
11. Medical air.
12. Medical vacuum.
13. An emergency oxygen connection.

14. Interface with a bulk oxygen system.
15. Medical gas manifold Room.

Chiller Plant:

A mechanical room will be located in the building and will supply chilled water at 42 degrees F and returned at 56 degrees F.
The chiller plant will be provided with a redundant magnetic bearing chillers producing chilled water. The capacity of the chillers is sized for 125,000 square feet of building. Heat rejection will be accomplished with redundant stainless steel cooling towers with fans on a VFDs. The towers will be located outside and adjacent to the chiller plant. The top of the towers will be level with grade. The towers will have a heated wet basin sump and flow by gravity to the condenser water pumps. Chilled water will be pumped to the building by redundant primary variable flow and redundant variable flow secondary chilled water pumps. Each chiller will also have redundant variable flow condenser water pumps.
The chiller plant will be provided with all the required monitoring and ventilation systems required. The chillers will employ refrigerant R134a.
A water side economizer system will be provided which will include redundant primary variable speed chilled water and condenser water pumps.
An air cooled process chiller will provide cooling for MRI and other dedicated building process loads.

Heating Plant:

A mechanical room will be located in the building and will supply hot water at 180 degrees F and returned at 140 degrees F.
The capacity of the boiler plant is sized for approximately 125,000 square feet of building. The boiler plant will consist of high efficiency condensing hot water boilers in an n+1 redundant configuration. Heating hot water will be pumped throughout the building. Redundant primary variable flow heating pumps will distribute water throughout the building to air handlers and terminal box reheat coils. Glycol will be produced via redundant heat exchangers and variable primary pumps for pre-heating coils. A similar system will be provided for a snow melt system covering approximately 4500 square feet at 150 btuh per square foot.

A backup fuel source for the boilers will be provided via a remote propane tank on the exterior of the building. The propane system will provide a back-up fuel source to the boilers in the event that the natural gas service to the building is interrupted.

Humidification and sterilization plant:

Steam will be generated for use in sterilizers and humidifiers. Steam pressure will be reduced where required. Redundant steam boilers with clean steam generators will be provided. Steam will be reduced 15 psig for humidification on the surgery floor of the building. There will be no steam humidification provided in the rest of the building air handlers.

Air Handling System Descriptions:

Roof mounted and/or spaced mounted custom built fan wall air handlers will be medium pressure blow through type and will include, supply and return fans, supply and return air plenums, a Merv 7 filter section, a plenum fan section, a glycol pre-heat coil section, a chilled water cooling coil section, a steam humidifier section and a Merv 14 final filter section. Air handling systems will be capable of 100% outside air for an air side economizer mode when the outside air temperature permits.
One air handler will serve the surgery area. Other air handlers will serve the remaining building.
Each operating room will have an OR type diffuser system with a linear slot air curtain surrounding the operating room work area.

Boiler and chiller Plant services:

Fan coils will be used to condition the boiler and chiller plants. Chilled water and hot water will be used for heating and cooling of these spaces.

Building terminal air distribution systems:

The building will be served by a variable volume medium pressure air system from the air handlers to the zone terminal box. Zone terminal boxes with hot water reheat coils will reduce the system air pressure, temper the air and distribute the air to the room where the air will be introduced through a series of diffusers. All building air will be ducted back to the return/relief fans.

Exhaust Systems:

Exhaust systems will be grouped as follows:
General and Toilet Exhaust:

Systems to serve toilets, bathrooms, janitor's closets, and other similar areas will be grouped through common exhaust fans.
Special Exhaust:
Systems to service special area requirements. Generally, these will be systems requiring separate duct systems such as special fume hoods, glass washing, central sterile, and other specialized areas.

Central Control Systems:

1. A direct digital control (DDC) system will be provided to perform the following:
2. Control of chillers, boilers, air handlers, pumps, heat exchangers, etc.
3. Zone Control. (VAV boxes)
4. A central building management system provided with color graphics will provide for complete control and monitoring at all mechanical equipment.
5. Design of system will be an open protocol to allow for multiple vendors to work on the project.

DIVISION 24 MEDICAL GAS SYSTEMS

Medical vacuum system:

The medical vacuum system shall consist of a stack mount, duplex system. Each pump will be sized for 100% of the total anticipated load. A vertical receiver will be provided.

Medical air system:

The medical air system shall consist of a duplex medical air compressor system with receiver. The plant will be provided with desiccant dryers. Each compressor shall be sized for the total anticipated load. Provide a vertical receiver, and medical air manifold. Medical Air manifold shall have the necessary PRV's, shutoffs and monitors.

Medical gases:

Nitrogen, Nitrous Oxide and Carbon Dioxide shall be stored in bottles in the medical gas room. The room will be vented thru an exterior wall. Additional space shall be provided in the medical gas room for additional cylinder storage.

Oxygen:

Oxygen shall be stored in bottles in the medical gas room. The room will be vented thru an exterior wall. Additional space shall be provided in the medical gas room for additional cylinder storage. A bulk oxygen system connection shall also be provided.

DIVISION 26 ELECTRICAL

Design Criteria and Standards

National Electrical Code 2011

International Energy Conservation Code 2012

UIT Integrated Audio Visual Equipment;

During the design of University projects, it will be the responsibility of the project engineer to consult with the project architect, the University Project Manager, and with the representative from the University of Utah Teaching and Learning Technologies Department (TLT) to determine the Audio / Visual (AV) needs of the project.

(1) Introduction

a. Application to A/E Design

This section applies to all equipment and supporting infrastructure where designed in rooms or areas required to support the installation of projector systems, audio visual systems, internet video conferencing systems, flat screen television monitors, and all associated equipment.

b. Not Used

c. Additional Abbreviations Used in This Part 3

1) **AFF.** "AFF" means above finished floor.

2) **A/V.** "A/V" means audio visual systems when the context refers to specific audio visual equipment. As used in this document, "A/V" also means all integrated technologies within the jurisdiction the Teaching & Learning Technologies Department when the context refers to the broader scope of such systems.

3) **INTEGRATOR.** "Integrator" means the Contractor or Contractor's Subcontractor who installs AV equipment.

4) **IVC.** "IVC" means internet video conferencing.

5) **TLT.** "TLT" means the University of Utah Teaching & Learning Technologies Department.

(2) A/E Coordination with TLT

a. A/E Pre-Design Project Evaluation

1) During initial design and planning for the use of any A/V or IVC equipment or future functionality, the A/E is required to meet with the University Project Manager and a representative from TLT, and if appropriate, the A/E's electrical designer.

2) Decisions made at this meeting shall be included in meeting minutes prepared by the A/E and distributed to the electrical designer, the University Project Manager, and the TLT representative.

b. TLT Involvement During Design

1) Any deviation from the pre-design project evaluation meeting plan will require approval by TLT through the University Project Manager, including any change in scale (enlargement or reduction) or any change in the architecture (or mechanical, electrical, HVAC, communications, etc. design) which may affect the operation or quality of the intended system.

2) Conditions or circumstances not addressed by this document which could affect the quality or performance of the final A/V system shall be submitted to the TLT representative through the University Project Manager for clarification and direction.

c. TLT Involvement During Construction / Installation

1) A representative from TLT shall be included in the preconstruction meeting for coordination regarding field installation of products, conduit, cable, back boxes, equipment, etc.

2) A representative of TLT shall be consulted through the University Project Manager for any deviation from plan during construction, including any change in scale (enlargement or reduction) or any change in the architecture (or mechanical, electrical, HVAC, communications, etc. design) which may affect the operation or quality of the intended system. TLT approval for any deviation must be obtained before installation. Unauthorized deviations shall be remedied in accordance with the terms of the A/E agreement and/or General Conditions.

3) Specify that A/V system startup and testing shall be witnessed by a representative of the University of Utah Teaching & Learning Technologies Department. The Contractor shall be directed to arrange TLT's involvement through the University Project Manager with ample notice.

(3) Installer and Product Requirements

a. Specify Minimum Installer Qualifications

1) Include in the specifications that the Integrator shall specialize in the installation of audio visual systems, and shall be able to demonstrate a minimum of 5 years continuous experience, having completed projects of similar project size and type.

2) Require the Contractor to include Integrator qualifications with A/V submittals.

b. Approved Manufacturers / Submittals

1) Products used in the A/E's design shall only be selected from approved manufacturers listed below. Each manufacturer on the approved list has demonstrated that it has manufactured quality A/V or associated electrical products in the United States for at least 10 years.

2) The following manufacturers have been approved for the design of University of Utah projects by TLT. Manufacturers are listed alphabetically and not in preferred order.

   a) Belden America

   b) Cisco Systems

   c) Crestron Electronics, Inc.

   d) Extron Electronics

   e) FSR, Inc.

   f) LeGrand USA

   g) LG Electronics

   h) Samsung USA

   i) Sharp Electronics

   j) Sony Electronics Corporation of America

   k) SP Controls

   l) Xantech LLC

3) All products provided by the above listed manufacturers are approved, and product specifications for each establish the minimum basis of quality for University of Utah projects.

   a) The products of other manufacturers may be approved only after review by TLT (appropriate site testing may be required to establish equivalency with approved manufacturers' similar products).

   b) Prior approval requests to the A/E for other manufacturers must be transmitted through the University Project Manager to TLT for review.

   c) TLT maintains the right of refusal when a requested substitution does not meet the quality standard.

c. Submittals for Unusual Systems

Any item of equipment, fitting, appurtenance, etc., that is not usually part of a standard A/V system in nature (*i.e.*, specialized back boxes, custom made equipment, back boxes designed to fit a specific manufacturer's equipment, etc.) must be submitted to the A/E and transmitted to the University Project Manager for approval by TLT.

(4) A/V Conduit

a. No Sharp Edges

Specify that all conduit shall be installed with no sharp edges that may contact wiring or cable. Require the installation of plastic bushings on fittings 1" or larger.

b. Minimum Conduit Size

1) Minimum conduit size for routing A/V wiring / cabling is ¾" EMT. 1" FMC may be substituted where retrofit conditions preclude installation of EMT.

2) Minimum conduit size between equipment cabinet, projector, and/or user connection boxes is 1½" EMT. 2" FMC may be substituted where retrofit conditions preclude installation of EMT.

c. Conduit Routing

1) A/V conduit runs shall be shown or specified in a manner that will minimize conduit length, but in all cases shall allow an easy pull for wire / cable installation / replacement.

2) Conduit runs may be omitted above ceilings where lay-in ceiling tile systems are present and ceiling space is not used as a plenum. For such cases, the conduit must terminate at box at one end, and extend above the lay-in ceiling tile system and ell to terminate horizontally.

3) Conduit Design / Installation Restrictions

a) Specify that the maximum A/V conduit segment length (including bends) shall not exceed 65', with a maximum of 270° of bends. Installations may exceed this length limit if the system has been designed to utilize receiver/transmitter pairs. In such cases, each long run over the 65' limit shall be documented in the construction drawings by the A/E, but in no case shall a documented run exceed 190' and 270° of bends.

b) The number of bends may be increased with the addition of accessible pull box(es) between segments.

3) Conduit runs shall not terminate or combine with any other system conduit grouping (specific system conduit grouping categories are listed below) or as restricted by State approved codes. Terminations at equipment cabinets and flat screen boxes are exempt but shall comply with State approved codes.

a) Conduit Grouping Categories

1) Line voltage wiring.

2) Control system cabling.

3) Analog audio, analog video, digital audio, digital video, twisted pair transmitter/receiver, serial data, IR data, and other similar signal cabling.

4) Speaker cabling.

4) Continuous Pull Strings

a) Specify that pull strings must be a manufactured product designed specifically for the intended use, and terminated at both ends in accordance with industry accepted methods.

b) Specify that continuous pull strings shall be installed in all conduit lengths exceeding 15', and in any length where more than 90° of bends occurs, and at every location where FMC has been installed.

c) Specify that one (1) pull string shall be installed in ¾" to 1¼" trade size conduits.

d) Require two (2) pull strings in any conduit 1½" trade size or larger.

(5) Wall Boxes

a. Wall Boxes In General

1) Specify or include on drawings that all low mounted wall boxes shall be installed at a height equal to outlet boxes installed under the electrical section.

2) Specify or include on drawings that all mid-wall boxes shall be installed at a height equal to switch boxes installed under the electrical section.

3) All boxes where cabinetry will be installed shall be shown or specified to be mounted 6" above work surface to the box center (or 6" above the top of backsplash where applicable). In all cases the installation height shall allow for installation of standard size wall plates without modifications.

4) Coordinate with the TLT representative for the installation height of all other wall boxes and back boxes. Show or specify the location / height of all boxes on the construction documents.

b. User Wall Connection /Control Connection Boxes

1) The A/E's design must include at least one (1) user wall connection box and one (1) user wall control connection box (described below). These boxes shall be a 4SQ or 4-11/16" boxes with appropriate plaster ring (2G minimum) with a depth of not less than 3" as measured from finish surface. *Note*: See special requirements for the control box plaster ring below.

2) The drawings shall show this box mounted at an outlet height similar to electrical switch boxes provided in the electrical section, except where installed cabinetry occurs [see (5) WALL BOXES / a. WALL BOXES IN GENERAL / 3) 'cabinetry' above.

3) No cover is required.

4) Control Box

a) Specify or show control box plaster rings with an opening not smaller than 2¾" high and 3-5/8" wide.

b) Drawings shall show one (1) ¾" EMT conduit between the control box and the equipment cabinet.

c) Drawings shall show one (1) ¾" EMT conduit between the control box and the projector (where applicable).

d) Drawings shall show one (1) ¾" EMT conduit between the control box and the flat screen (where applicable).

(6) Equipment Cabinets

a. Wall Mounted Equipment Cabinets

1) Wall mounted equipment cabinets shall be shown or specified with the cabinet bottom at 36" AFF. The cabinet top shall not exceed 78" AFF.

2) The A/E shall notify its electrical designer, and specify or show on A/V drawings two (2) duplex outlets on a single, dedicated 20A 120V circuit. These outlets shall be located within the cabinet at either top-left or top-right corner of the back box.

b. Floor Mounted Equipment Cabinets

1) The A/E shall notify its electrical designer, and specify or show on A/V drawings four (4) duplex outlets on two (2), dedicated 20A 120V circuits, on the same phase.

2) These outlets shall be located within the cabinet at top-left or top-right corner, and at either the center-left or center-right of the back box.

c. Cabinet Clearances

1) The A/E's design shall provide the following clearances in the design:

a) Equipment cabinets shall have 36" minimum working space in front of cabinet.

b) Equipment cabinet doors shall have 30" minimum swing clear space as measured from the appropriate side of the closed cabinet.

c) The A/E shall insure that no hydronic HVAC or plumbing equipment / piping will be installed directly over A/V equipment cabinets. Additionally, maintain a 24" clearance from hydronic HVAC and plumbing around the cabinet. Ductwork is exempt from this requirement.

d. Supporting Hardware
Equipment cabinets shall be securely installed to support 150 pounds minimum, installed level and square.

e. Climate Control
Equipment cabinets shall be located in a climate controlled space with temperature of 50-80°F, humidity of 0-90% non-condensing, and in a suitably dust free location.

f. Conduit Terminations
1) Require the Contractor to terminate equipment cabinet conduit runs in wall boxes located directly behind the cabinet, flush with finished wall, and at an appropriate height to be hidden when the cabinet is installed and closed.

2) Wall Box Capacity Limits

a) Up to six (6) ¾" to 1" conduits shall terminate in a wall box 4SQ or larger.

b) Up to four (4) 1¼" conduits shall terminate in a wall box 4-11/16" or larger.

c) Conduits 1½" or larger shall terminate in an 8" x 8" x 4" steel box (or larger as appropriate for the quantity of conduits being terminated).

3) Covers for boxes serving equipment cabinets are not required.

g. Telecom Room Data Cabling
The A/E's design shall include at least two (2) Cat6 (or better) data lines, home run, between a Telecommunication Room and the equipment cabinet. The installation shall comply with Cat6 requirements. Direct the Contractor to terminate both ends of all cables. The design shall comply with the requirements of 3.6 Electrical / Part 2 Communications & Security Wiring Systems.

h. Future Equipment Cabinets
1) Where one or more equipment cabinets are planned but not installed by the project, provisions shall be made to install cabinet(s) at a later date.

a) The A/E's design shall show the location and size for each future cabinet.

b) Include in the project the installation of a flush mounted wall box for each cabinet where the cabinet is planned. The wall boxes shall be specified to be installed with covers matching either the wall finish or electrical covers in the same room.

c) Include in the project the installation of at least two (2) 2" conduit runs, both terminating above the ceiling and in the flush mounted wall box.

d) Include in the project the installation of appropriate spare circuit(s) terminated above ceiling to facilitate MC/AC extension(s) into the wall

for future termination in the future cabinet. The A/E shall notify its electrical designer, and specify or show these circuit terminations on electrical drawings.

(7) Recessed Ceiling Speakers

a. Ceiling Load Capacity
The ceiling system must be designed to support a minimum of 25 pounds at each speaker location. The A/E is cautioned to coordinate the weight of speaker equipment with the ceiling selected for the project.

b. Required Clearances
Specify a clear area of 14” above the finished ceiling surface for all speakers except 6”-nominal and 4”-nominal speakers where 10” minimum is required. [Kelly to Jan/Brett: This was originally written as both 14” above the finished ceiling AND 14” above the speaker… I picked the ceiling. Correct me if I goofed.]

c. Conduit to Ceiling Speakers

1) Recessed ceiling speaker conduit runs shall not terminate in boxes used for any other system, except for terminations at an equipment cabinet.

2) The speaker system design shall include at least one (1) ¾” EMT home-run conduit from speakers to (in order of priority) equipment cabinet, projector, or as directed by TLT.

3) Speaker locations may be combined in conduit runs as appropriate.

a) One (1) to six (6) locations shall be served by ¾” EMT conduit (minimum conduit size).

b) Seven (7) to twelve (12) locations shall be served by 1” EMT conduit (minimum).

c) Thirteen (13) to twenty-four (24) locations shall be served by 1¼” EMT conduit (minimum).

d) In no case shall more than twenty-four (24) locations be served by each home run.

4) Inaccessible Ceiling Spaces

Where space above the ceiling will be inaccessible, specify conduit directly to each speaker enclosure and/or speaker rough-in enclosure. Up to 18” of FMC may be specified where appropriate to facilitate the installation.

5) Accessible Ceiling Spaces

Where space above the ceiling will be accessible, require the Contractor to install conduit to within 9” of the speaker enclosure location.

(8) Wall Speakers

a. Wall Speaker Boxes

1) Wall speaker boxes shall be specified as 1G minimum.

2) No cover is required.

3) Direct the Contractor to mount wall speaker boxes at 12” below finished ceiling to box center.

b. Conduit to Wall Speakers

1) Wall speaker conduit runs shall not terminate in boxes used for any other system, except for terminations at an equipment cabinet.

2) The speaker system design shall include at least one (1) ¾” EMT home-run conduit from speakers to (in order of priority) equipment cabinet, projector, or as directed by TLT.

3) Speaker locations may be combined in conduit runs as appropriate.

a) One (1) to four (4) boxes shall be served by ¾” EMT conduit (minimum conduit size).

b) Five (5) to eight (8) boxes shall be served by 1” EMT conduit (minimum).

c) In no case shall more than eight (8) boxes be served by each home run.

(9) Flat Screen Televisions

a. Wall Design Requirements

1) At least three (3) steel studs, capable of supporting 200 pounds across two (2) studs shall be designed for installation as part of the wall system.

2) The A/E shall insure that no HVAC or plumbing piping system shall be routed behind the area reserved for the television.

3) The A/E shall insure that no conduit shall be installed within 2” measured horizontally on both sides from edge of studs, or within stud area, or behind the area reserved for the television screen so that hollow wall anchors may be installed.

b. Specialized Wall Box

1) A specialized box shall be specified for installation, centered vertically and horizontally (within reason) behind screen.

a) Basis of the specification shall be an FSR Inc. model PWB-270. Requests for approval of substitutions must be submitted to the A/E during bidding and transmitted to TLT through the University Project Manager for review. TLT retains the right of refusal for products that do not meet or exceed the FSR specifications.

b) At least one (1) 1½" EMT and one (1) ¾" EMT shall terminate in the specialized box behind the screen, centered horizontally and vertically.

c) The A/E shall coordinate with the electrical designer to include two (2) duplex outlets on a single, dedicated 20A 120V.

d) Specialized box covers shall be included in the specifications, painted to match wall the finish.

(10) Ceiling Mounted Projectors

a. Ceiling Design / Support Requirements

1) Generally, ceiling mounted projectors require a 12" x 12" area of the ceiling, centered on the screen centerline and located between 12' and 16' from the viewing surface of the screen. If the project requires specialized equipment with unusual requirements, coordinate with TLT through the University Project Manager for design instructions.

2) Include a projector system support system in the design. The designed support shall be able to support a bolted, clamped, or otherwise fastened mounting plate capable of supporting 100 pounds.

b. Projector Electrical Requirements

1) Include in the design, one (1) duplex outlet on a 20A 120V dedicated circuit installed within 12" of the center of the support system designed for the projector.

a) The outlet shall be installed below the finished ceiling surface. Where a projector lift system is designed, the outlet shall be located within the projector lift ceiling box, or within 12" of the lift mechanism.

b) One circuit may serve a maximum of two (2) projectors.

c. Conduit / Box Requirements

1) The design shall include at least one (1) 1-1/2" EMT conduit, terminated within 12" of the center of the projector support (measured horizontally). This conduit shall run between the projector location and equipment cabinet. *Note*: When the design is to include a future projector, require the Contractor to install the conduit between the future projector support (12" horizontally from the center of the future support) to the user wall connection box intended for the future equipment cabinet.

a) Where a lay-in ceiling tile or other accessible ceiling system is designed, this conduit may terminate with a bushing rather than a box.

b) Where a non-accessible ceiling is designed, this conduit shall terminate in a 4-11/16" minimum box with 2G plaster ring installed flush with the finished ceiling surface.

c) In all cases where the ceiling space is plenum rated, this conduit shall terminate in a 4-11/16” minimum box with 2G plaster ring installed flush with finished ceiling surface.

d. Motorized Projector Lift System

1) Where a motorized projector lift system is included in the design, one (1) dedicated ¾” EMT conduit shall be routed between the equipment cabinet and the projector lift mechanism. This conduit shall be separate from all other conduit and boxes.

a) *Note*: This conduit shall be separate from class 2 installations so that line voltage wiring may be installed.

(11) Motorized Projection Screens

a. Wall Control Box

1) Include in the design, one (1) motorized screen wall control box. The box shall be a 4SQ or 4-11/16” box with a depth of not less than 3” as measured from finish surface, and with an appropriate plaster ring (2G minimum).

2) The design shall include one (1) 20A 120V dedicated circuit to the wall control box.

3) Line voltage conductors shall be routed through one (1) ¾” EMT connecting the wall control box and the equipment control cabinet.

4) The design shall include one (1) ¾” EMT conduit routed between the wall control box and left side of the screen. Terminate this conduit in left side motor box of installed screen.

a) The A/E may allow a short section (24” or less) of FMC to be used to facilitate installation.

b) Specify 12AWG or larger THHN/THWN stranded or solid conductors, one (1) each of red, white, black or blue, and green. Require terminations of the green conductor (equipment grounding) on both ends with a pigtail to facilitate installation of control and screen motor.

5) Show or specify the mounting height for the wall control box at the same height as electrical switches in the room. Include a blank cover matching electrical covers in the room.

b. Screen Limit Settings by Others

Include a statement that a representative of the University of Utah Teaching & Learning Technologies Department will adjust the screen limit settings after installation is completed.

(12) IVC Systems

a. Box

1) The design shall require one (1) 4SQ (minimum) box with 2G ring for each camera.

2) Locate the box 10” OC, measured horizontally from the camera center line, with the bottom flush with the bottom of the camera mount at each camera location.

3) No cover is required.

b. Conduit

1) The design shall require one (1) ¾” EMT installed between each camera location.

2) The design shall require one (1) 1” EMT home-run from each camera location to the equipment cabinet.

(13) Stationary Table Top or Podium Connections

a. Design / Installation Coordination with TLT
Require the Contractor to meet with the A/E, the electrical contractor (if needed), the University Project Manager, and a representative of TLT for coordination of responsibilities prior to beginning A/V work on stationary podium or stationary table top installations.

b. Floor Box

1) The design shall include at least one (1) floor box for the installation of power and Class 2 communication cabling. Box specifications shall be per the electrical design.

2) The floor box may be a combined unit capable of housing both cable classes, or may be separated as required.

3) Require each floor box to be hidden from view when cabinetry/furniture is installed.

c. Conduit

1) Conduit, including appropriate FMC, may be designed to terminate in boxes directly in cabinetry/furniture.

2) Include in the design, one (1) 1½” EMT conduit between cabinetry/furniture and the equipment cabinet.

3) Where a future equipment cabinet is planned, require the Contractor to install one (1) 1½” EMT between the location for a flat screen or projector and the cabinetry/furniture.

d. Duplex Outlets
   1) Two (2) duplex outlets are required for each installation and may be combined with other room convenience outlets where appropriate. Coordinate with a representative of TLT during design.

   2) When specified furniture includes line voltage outlets, such outlets shall not replace, but shall be in addition to the outlets required above.

      a) Require the Contractor to connect furniture mounted outlets to the same line voltage circuit required above.

e. Telecom Room Data Cabling
   1) Include in the design, at least four (4) Cat6 or better data lines to be installed, home run, between a Telecommunication Room and the cabinetry/furniture. Require the installation to comply with Cat6 requirements. Require the Contractor to terminate both ends of all cables.

   2) When the equipment cabinet is an integral part of the cabinetry/furniture, require the installation of two (2) additional Cat6e (or better) data lines for a minimum of six (6).

f. Additional Integral Equipment Cabinet Requirements
   1) In addition to the extra Cat6 cabling described above, when the equipment cabinet is an integral part of the cabinetry/furniture, the requirements below shall be met.

      a) The A/E shall insure that no hydronic HVAC or plumbing equipment / piping will be installed directly over A/V equipment. Additionally, maintain a 24” clearance from hydronic HVAC and plumbing around the A/V equipment cabinet in the cabinetry/furniture. Ductwork is exempt from this requirement.

      b) Integral equipment cabinets shall be securely installed in the cabinetry/furniture to support 150 pounds minimum, installed level and square.

      c) A/V equipment shall be located in a climate controlled space with temperature of 50-80°F, humidity of 0-90% non-condensing, and in a suitably dust free location.

      d) Require the Contractor to terminate equipment cabinet conduit runs in wall or floor boxes located directly behind or under the cabinetry/furniture, flush with finished wall or floor, and at an appropriate location to be hidden when the cabinetry/furniture is installed.

      e) Box covers are not required.

f) Up to six (6) ¾” to 1” conduits shall terminate in a wall or floor box 4SQ or larger.

g) Up to four (4) 1¼” conduits shall terminate in a wall or floor box 4-11/16” or larger.

h) Conduits 1½” or larger shall terminate in an 8” x 8” x 4” steel box (or larger as appropriate for the quantity of conduits being terminated).

(14) Mobile Table Top or Podium Connections

a. Design / Installation Coordination with TLT
Require the Contractor to meet with the A/E, the electrical contractor (if needed), the University Project Manager, and a representative of TLT for coordination of responsibilities prior to beginning A/V work on mobile podium or mobile table top installations.

b. Floor Box

1) The design shall include at least one (1) floor box for the installation of power and Class 2 communication cabling. Box specifications shall be per the electrical design.

a) If not specified by the electrical designer, require a LeGrand RFB6, RFB11, or prior approved equal floor box, complete with all appropriate accessories.

2) The floor box may be a combined unit capable of housing both cable classes, or may be separated as required.

3) Require each floor box to be flush with the finished floor.

c. Conduit

1) Include in the design, one (1) 1½” EMT conduit between cabinetry/furniture and the equipment cabinet.

2) Where a future equipment cabinet is planned, require the Contractor to install one (1) 1½” EMT between the location for a flat screen or projector and the cabinetry/furniture.

d. Duplex Outlets

1) Two (2) duplex outlets are required for each installation and may be combined with other room convenience outlets where appropriate. Coordinate with a representative of TLT during design. [Note to Kelly: 3.6 Electrical Part 1 needs a reference to this.]

2) When specified furniture includes line voltage outlets, such outlets shall not replace, but shall be in addition to the outlets required above.

a) Require the Contractor to connect furniture mounted outlets to the same line voltage circuit required above.

e. Telecom Room Data Cabling

Include in the design, at least four (4) Cat6 or better data lines to be installed, home run, between a Telecommunication Room and the cabinetry/furniture. Require the installation to comply with Cat6 requirements. Require the Contractor to terminate both ends of all cables.

f. Additional Integral Equipment Cabinet Requirements

1) In addition to the extra Cat6 cabling described above, when the equipment cabinet is an integral part of the cabinetry/furniture, the requirements below shall be met.

a) The A/E shall insure that no hydronic HVAC or plumbing equipment / piping will be installed directly over the intended location of mobile A/V equipment. Additionally, maintain a 24” clearance from hydronic HVAC and plumbing around the A/V equipment cabinet in the cabinetry/furniture. Ductwork is exempt from this requirement.

b) Integral equipment cabinets shall be securely installed in the cabinetry/furniture to support 150 pounds minimum, installed level and square.

c) A/V equipment shall be located in a climate controlled space with temperature of 50-80°F, humidity of 0-90% non-condensing, and in a suitably dust free location.

d) Require the Contractor to terminate equipment cabinet conduit runs in wall or floor boxes located directly behind or under the intended location of cabinetry/furniture, flush with finished wall or floor, and at an appropriate location which would normally be hidden when the cabinetry/furniture is in its intended place of use.

e) Box covers are required

f) Up to six (6) ¾” to 1” conduits shall terminate in a wall or floor box 4SQ or larger.

g) Up to four (4) 1¼” conduits shall terminate in a wall or floor box 4-11/16” or larger.

h) Conduits 1½” or larger shall terminate in an 8” x 8” x 4” steel box (or larger as appropriate for the quantity of conduits being terminated).

Installation Guidelines for Cabling Infrastructure;

1. INTRODUCTION

The intent of this document is to establish the general specifications for a premise structured cabling system which will meet the voice, data, and communications needs of The University of Utah. This is a wiring standards document only. The design document for Architects and Engineers, which covers all construction portions, can be found on line on the University of Utah Facilities website.

2. SPECIFICATION REFERENCES

A. Contractor will install our proposed solution per the manufacturer's requirements and in accordance with NFPA-70 (*National Electrical Code®*), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:

- ANSI/NECA/BICSI-568: Standard for Installing Commercial Building Telecommunications Cabling
- ANSI/TIA/EIA-568-B.1: Commercial Building Telecommunications Cabling Standard, Part 1
- ANSI/TIA/EIA-568-B.2: Commercial Building Telecommunications Cabling Standard, Part 2
- ANSI/TIA/EIA-568-B.3: Optical Fiber Cabling Components Standard
- ANSI/TIA/EIA-569-A: Commercial Building Standard for Telecommunications Pathways and Spaces
- ANSI/TIA/EIA-606-A: Standard for the Telecommunications Infrastructure of Commercial Buildings administration and labeling
- ANSI/TIA/EIA-607 (A): Building Grounding and Bonding Requirements for Telecommunications
- ANSI/TIA/EIA-526-14A: Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant

B. Contractor will comply with federal, state, and local codes, rules, regulations, and ordinances governing the work.

1. Contractor will note items in the drawings or the specifications, which would be code violations; we will promptly call them to the attention of the University of Utah representative.

2. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications will apply.

3. GENERAL INFORMATION

In an effort to standardize all structured cabling on the University of Utah campus, the following requirements need to be followed when bidding on work.

A. Contractor must be currently be part of CommScope/Systimax , Business Partner Program and be able to warranty the installation.

B. Contractor must have at least one BICSI RCDD on staff. All technicians terminating and testing cable must have successfully completed the manufacture installation class.

C. The contractor must provide references of projects completed by the company, and the assigned Forman.

D. The UIT department on Campus will assist with layout of the ER, and any TR's. In most cases the UIT staff will do all of the fiber work. The University IT, or a contractor directly hired by UIT will <u>always</u> do the fiber connection to the building.

E. As of January 15, 2014 the approved SYSTIMAX Business Partners in Utah

1. Americom Technology
2. Cache Valley Electric
3. IES Commercial
4. Wasatch Electric
5. Hunt Electric
6. Others may be added by the manufacture, or some may be removed.

4. CONTRACTUAL RELATIONSHIP

A. The contract for installation may come from the University IT Department or the General Contractor selected by the University and DFCM. This is a labor contract only.

B. If additions, deletions, modifications or clarification to the RFP become necessary, the changes will be issued in writing to all bidders.

C. The Contractor is responsible to meet the schedule provided to them by the General Contractor

D. If after the award of the project, the Contractor becomes aware of any possible problems which could result in the delay of the completion of the structured cabling, the Contractor must immediately notify the University of Utah IT representative, as well as the General Contractor.

E. The Contractor is expected to comply will University of Utah terms and conditions.

F. Payment terms will be discussed at the time of the bid.

G. The University of Utah will not be liable for any costs incurred to present a bid or proposal.

H. RESPONSIBILITIES

A. The University of Utah IT or the selected General Contractor will be responsible for the following:

1. Allow the Contractors employees access to the site at all reasonable hours to perform the installation.

2. Provide detailed drawings of the site including cable tray.

3. Inspect work when notified by the contractor that a part is ready for acceptance.

B. The Contractor will be responsible for the following:

1. Providing all supervision, labor, tools, equipment, materials, and transportation to the project site.

2. The University IT Department will supply all materials; the Contractor is responsible for picking up the materials at 585 Komas Drive in Research Park, and transporting them to the building and getting them to the proper floor, or work area. A direct shipment from local distribution may be available for large order; the contractor would then be responsible for all materials at the job site.

3. Promptly repairing all damage to the building due to carelessness of contractor employees and exercising reasonable care to avoid any damage to the building. Reporting to University IT, General Contractor, and any damage to the building that may exist or may occur during the contractor's installation project.

4. Installing the wire, cable and hardware in accordance with the specifications outlined herein.

5. Conducting tests and inspections as specified post-installation.

6. Promptly correcting all defects for which contractor is responsible as determined by the General Contractor.

7. Removing all tools, equipment, and debris from the premises and leaving the premises clean and neat upon completion of the work .Any unused materials that were supplied by UIT are to be returned to the UIT warehouse.

8. Abiding by the safety and security rules in force on the work site per local and governmental regulation.

9. Following industry standard installation practices and using personnel who have been certified in the specific manufacturer product line which is being offered and consistent with all other items as defined by Section 3.

10. Contractor is responsible for cost associated with the required safety aspects of the General Contractor. Each contracting employee must attend the Contractor Orientation Class as well as Site Specific training and task training appropriate to the plant or plants they will be attending. Failure to comply with safety regulations could be grounds for immediate dismissal from the property.

5. APPROVED 4 PAIR CABLE

A. The only approved cable manufacturer is CommScope. No substitutions or 'equals'. Brands listed under the CommScope name are Uniprise, or Systimax. Cable will be determined by the University staff. Plenum cable (CMP) will be used when required by the Mechanical Engineer. The category 5e cable is only allowed for certain voice usage like elevator phones, fax machines, analog single line courtesy phones, pay phones etc.

B. Acceptable part numbers for cable are:

- Category 5 E 5504M Plenum and 55N4R PVC
- Category 6 7504, 1071 Plenum and 75N4, 2071 PVC
- Category 6-A 2091B Plenum and 1091 PVC

6. 4 PAIR CABLE COLORS

   A. The University of Utah IT approved colors are

      - Category 5E and 6 designated for data usage WHITE
      - Category 5E and 6 designated for voice usage BLUE
      - Category 5E and 6 designated for Phillips Medical YELLOW
      - Category 6-A Gray

7. APPROVED CONNECTIVITY HARDWARE

   A. The only approved manufacturer for connectivity hardware is COMMSCOPE, which may include SYSTIMAX or UNIPRISE. This includes:

      - jacks
      - modules
      - faceplates
      - patch panels
      - modular furniture adapters
      - surface raceway adapters
      - *No substitutions or equals allowed*

8. APPROVED CONNECTIVITY COLORS

   A. The approved colors are White, Gray, Ivory, and Black on jacks and modules.

   B. Faceplates are the same, plus stainless steel.

   C. The voice data connectivity should match the electrical devices.

   D. The color will be determined by the Architect, or Campus Design project manager.

   E. In cases where there is modular office space and the termination is in part of the modular space, the color of the adapters and jacks must match the furniture.

   F. Category 6A cable is always terminated with gray jacks regardless of the color of faceplate.

9. UNIVERSITY TERMINATION STANDARD

All cables are to be terminated to the T 568-A standard. This is for all jacks, patch panels and direct terminated RJ 45's for wireless access points.

TR – TELECOMMUNICATIONS ROOMS

A. The University will layout all rooms at the time of the install. A standard TR will include:

1. 3- each 7 foot 2 post racks B-Line or CPI Black

2. 2 –each vertical cable managers B-Line SB864810D084FB 10 inch vertical manager. Some installs may substitute or add B-Line SB86486D084FB 6 inch vertical cable managers

3. All racks will be anchored to the floor with approved concrete anchors.

   a. Verify with the Electrician or General Contractor the depth to drill

   b. Verify there are not power conduits in the floor

   c. Racks will have ladder rack mounted to the top the full length of the racks, and supported to the wall

   d. Ladder rack needs to be mounted vertically above all riser conduits with proper attachment hardware. In most rooms this will consist of two pieces of ladder rack.

   e. When cable drops out of the cable tray to the racks, it must drop out using proper sized cable exits like WBT Tray part number RADIUS DOWN 6.This needs to be sized to accommodate all cables in the project, plus some future expansion racks also need ladder rack running to an opposing wall for support with proper support.

4. The average telecommunications room will consist of the following hardware parts: CPI or B-Line is acceptable

   a. 3 each two post 19 inch racks black

   b. 2 or possibly 3 each B-Line vertical cable managers (see part numbers above)

   c. 4 each CPI 12 inch runway part #10250-712

   d. 3 each CPI rack to runway kit part # 12730-712

   e. 2 each CPI angled wall bracket part # 11421-712

f. 4 each CPI vertical wall bracket (pair) part # 10608-701

g. 1 each CPI junction kit part # 11302-701

h. 1 each WBT 12 inch tray dropout part # radius down 12

i. ER- EQUIPMENT ROOMS

A. Equipment Rooms will be laid out similar to TR's.

1. A fourth rack may be added if the ER is also used as a TR.
2. This room will house incoming service from the University and local providers.
3. This room will be the originating point for all copper and fiber building backbone.
4. Copper backbone will terminate on a wall on 110 style blocks, Sytimax or equivalent.
5. This is to include cross connect back boards and troughs.
6. The riser cable will always feed from the bottom, with the cross connect back boards on the top.
7. The Telco service will need to be broken out on 110 blocks that will include the 25 pair male to blunt telco cables. This is always the start at the far left of the frame.
8. The number of cables needed will be determined by the usage of the building. The average will be eight (8).

10. WIRELESS ACCESS POINT

A. Each wireless access point will include one (1) category 6 cable terminated with an RJ-45 plug to the T- 568A wire standard, and one (1) category 6-A cable terminated on a surface jack to the T-568A standard in the ceiling. The 6-A cable is for future use.

1. The cables will follow the standard University cable numbering system.
2. The number of wireless access points will be determined by the UIT wireless team.
3. In some cases the wireless AP's may be all pulled to a specific floor. Example on a five story building all cables <u>may</u> be pulled to the 3rd floor, or a middle floor. This determination will be made at the time of the bid. The determination will be based off whether the switches are managed by UIT, or the individual department that will occupy the building. In this case all cables will be numbered by the floor they originate on. <u>On Dental cables will be pulled to the individual floor the originate on .</u>

4. In most cases the UIT installation staff will do the installation of the wireless access point.

5. STANDARD CABLE LOCATIONS

A. A standard location will consist of three (3) 4 pair cables; the type of cable and termination will be specified by project. For the Dental Building project a standard location will be (2) two CommScope 7504 Plenum rated category 6 cables terminated on patch panels. There may be areas at the dental chairs where an additional category 6 cable is needed.

1. Cables must terminate on the floor they originate.

2. In cases of floor boxes, poke through etc. the conduit may be run to the cable tray on the floor below, requiring the cable to be taken into the TR and brought back up through the building backbone raceway.

3. Data cables will be terminated on modular patch panels, cables designated for voice will terminate on rack mount 210 style punch panels.

4. All conference rooms, fax print areas will also get a category 5e cable for voice use, they will terminate on a rack mounted 110 block at the communications room , and on a USOC style jack at the other end .

11. SAFETY

A. The contractor must follow the General Contractor's safety requirements. This will include:

1. hard hats

2. safety vests

3. eye protection, and

4. Approved work boots when working on a University project.

B. The contractor must provide any tie off equipment when working on ladders or heights.

C. The technicians must also be certified when using power activated fasteners, and use approved extension cords.

D. Technicians may be required to attend safety meetings of the General Contractor, and may be required to hold weekly safety meetings for their own staff.

12. FIBER BACKBONE

    A. The fiber backbone will be installed in a star configuration from the ER with a composite cable consisting of twelve (12) single mode fibers and twenty four (24) OM3 or OM4 fibers.

    B. All fibers are to be terminated with SC connectors. Approved termination methods are:

        1. anaerobic field polish, or

        2. fusion spliced only

    C. All fibers are to be terminated in Corning CCH, or PCH boxes in the center rack in the ER.

    D. Cables will be put in order with the lowest floor first with the OM3 fibers placed in position A and B, on a Corning CCH-CP12-E6 aqua panel. The single mode will be placed in position C on a Corning CCH-CP12-3C panel. All fibers are to be visually inspected as well as tested with a source and meter.

    E. Heat shrink is required on all bundles, and overall cable once the sheath has been removed.

    F. All composite cables are to be labeled as the cables go into the CCH box.

    G. If using fusion splice method on a PCH box a PC4-SPLC-12SR splice tray and bracket is required. Approved composite fiber cable manufactures are Corning Cable Systems or CommScope.

    H. In most cases the UIT staff will install and terminate the backbone fiber. This will depend on the project. <u>On the Dental project the University will install, terminate and test all fiber</u>

13. COPPER BACKBONE

    A. The copper backbone size will be based on a project by project basis. The average is 100 pair. <u>For Dental the University will install, terminate and test all copper backbone cables .</u>

    B. The cable must be a riser cable CMR 24AWG.

    C. In cases where the backbone cable is not in EMT conduit, plenum cable may be required. This should be verified with the Mechanical Engineer.

    D. At the ER the backbone cable will be terminated on 110 style wall blocks, at the TR the cable shall be terminated on a rack mount 110 style block (Siemon part # S110A1-100RFT, or a pre-approved equal).

    E. Rack mount cable managers must also be provided for cross connects. A cable may need to be run in the ER from the wall field to a rack.

F. From the ER to each TR six (6) category 6-A cables must also be installed. In the ER they will be terminated on a 6-A patch panel. At the TR they will be terminated on a surface box on the wall by the first network rack at approximately 84 inches from the floor. UIT will give final location at the time of the install.

14. CABLE TESTING AND DOCUMENTATION

A. Cable testing must follow all ANSI/TIA/EIA TSB 67 basic test specifications.

1. Test results must be submitted within seven (7) business days of completion of testing.

2. The University uses IDEAL testers. If using an IDEAL tester load all test results on to a memory disc and return to the University IT staff.

3. If using a FLUKE or other type of testers turn in printed documentation of all test results, and an electronic (disc) version.

4. If specialized software is required to read the report, the contractor shall supply the necessary software.

5. All cable testers must be ISO 9001 certified. Backbone cable must be tested for continuity and polarity.

6. The Commissioning Agent may also require a copy of the test results. CAD DRAWINGS

A. A hard copy size D print needs to be updated with cable numbers and placed in each TR. This needs to be done as a floor is completed.

B. An electronic version must also be provided at the end of the project. This needs to be done in CAD on the Power prints, in the Electrical plans.

15. FIRE STOPPING

A. In most cases cable tray and riser conduit fire-stopping will be completed by the electrician. Verify with the General Contractor before bidding.

B. In cases where an additional penetration is made by the contractor proper materials must be used. Approved and preferred manufactures are:

1. STI EZ Path

2. Ready Sleeve

3. HILTI fire-stopping

C. In patient care areas all conduits passing through a fire wall will need to be filled with re-enterable putty, this is to be completed by the data cabling contractor.

16. CABLE NUMBERING PLAN

    A. Cables are to be numbered with 4 digits

        1. The first digit will be the floor number.

            a. Each type of cable will start (floor) 001 example first floor 1001 and move up in consecutive order.

            b. Second floor would start with 2001 etc.

            c. If there is more than one TR on a level, the numbering will stay the same with an “A” or “B” in the front, example A -2001.

            d. All cables will follow this numbering scheme, regardless of the usage. Wireless access points, fire alarm, KRONOS clocks, building automation, security etc. are all used for some type of data transmission and should be numbered consecutively.

            e. Each identifier shall be unique.

            f. A UIT employee will assist in the numbering plan as the project starts.

17. LABELING

    A. Follow ANSI/EIA/TIA 606 Standard.

        1. All cables must have a printed label that wraps around the cable at the patch panel, approximately three (3) inches back from the termination and at the jack end, and at the work station end approximately 5 inches from the termination.

        2. All faceplates need to have visible printed labels on the top and bottom (white tape with black lettering).

        3. All patch panels need to be labeled with a printed label secured to the patch panel.

        4. All copper and fiber back bone cables need labels that wrap around them designating where they are going. Example 2nd floor room 2XXX.

        5. 110 blocks must be printed paper and labeled every 4 pair for horizontal cable, and every 5 pair for multi pair distribution cable.

18. FIBER CONNECTIVITY TO THE BUILDING

    A. All buildings on Campus must be connected by a Sumitomo Future Flex System.

    B. <u>On the Dental project the University will install all fiber to the building.</u>

        1. A seven (7) tube Outside Plant Cable must be installed from the ER to the nearest Tube Distribution Unit (TDU), an eighteen (18) count single mode fiber bundle is to be installed to a designated building.

        2. No splicing is allowed.

        3. The fiber will terminated in the ER on a designated rack into a Corning CCH-04U FTU, with anaerobic field polished SC connectors. Corning CCH-CP12-3C panels are required.

        4. The distant end will be terminated with anaerobic field polished SC connectors in either a Corning CCH box, or a Corning EMF frame. This will be determined at the time of the project bid.

        5. The fiber must be tested at dual wavelengths, bi-directional. The test results must be turned into the General Contractor, and the University IT Department, before a building connection will be established. In certain cases a copy may also need to be given to a Commissioning Agent.

19. CABLE MANAGEMENT

    A. A 1-U cable manager Siemon 143-3 or approved equivalent horizontal manager will be above and below all data patch panels.

        1. Vertical cable managers B-Line SB864810D084FB are to be placed between each 2 post rack.

        2. If a rack mount 110 or 210 panel is used a Siemon S110RWM01 will be installed above and below each rack mounted 110 blocks.

20. DRESSING AND BUNDLING CABLES

    A. All cables going into the racks are to be neatly bundled/weaved from the place they exit the cable tray.

    B. Cables lying in the tray should be neat and straight, but do not need to be bundled or weaved.

C. Use only velcro ty-wraps when bundling any copper or fiber cables.

21. GROUNDING AND BONDING

A. A ground bar will be provided in each TR.

B. Contractor is responsible to bond and ground all new equipment racks, cabinets and raceway.

C. Grounding needs to conform to ANSI/TIA/EIA 607 Commercial Building Grounding and Bonding Requirements for Telecommunications, National Electrical Code, ANSI/NECA/BICSI 568, and manufactures grounding requirements.

D. Contractor will connect all racks, cabinets and raceway to the provided ground bar via a #6 AWG green stranded insulated conductor.

22. FIRE ALARM PANELS

A. Building fire panels will require two (2) category 6 cables terminated on a surface box inside the fire alarm panel with category 6 jacks.

B. It will require a single gang faceplate.

C. Cables are to be run to the ER if within 100 meters.

1. If the panel is not within a 100 meters, run to a TR specified by UIT.

23. MODULAR WORKSPACE

A. In cases where there is wall track on a fixed wall the cables will terminate in a standard box provided by the electrical contractor with a flush plate.

B. In cases where there are panels against the walls or in open areas the cables must terminate inside the cubicle with a modular furniture adapter.

1. This may be at the bottom or the middle depending on the selected manufacture of modular office space.

2. It is the responsibility of the installation contractor to work with the General Contractor to make these determinations.

C. Colors of the jacks and adapters are to match the modular furniture when terminating within the space.

24. EMPLOYEE IDENTIFICATION

A. All personnel working on a University projects must have identifying apparel at all times such as:

1. Shirts
2. safety vests
3. hard hats, or
4. name tags

B. The company name must be clearly identified.

25. ACCEPTANCE

A. The University IT (UIT) Department must give a signed acceptance at the end of the project before final payment is made by the General Contractor.

B. The accepted project will also be rated by the UIT Department, and be used for future project recommendations.

26. PARKING

In most cases any parking permits will be the responsibility if the awarded contractor, work with General Contractor do make final determination.

27. WARRANTY

Contractor must submit paper work to the manufacturer, and be authorized to warranty the labor and materials to the manufacturer specifications.

28. EXTRA CABLE/ SCRAP

If the University supplies the cable, all unused cable is to be returned to the UIT office, including short scrap pieces.

29. PREFERRED MANUFACTURERS

A. Below is a list of preferred manufacturers for items that are not listed as “no substitutions”. This is for cable management, labels, ladder rack installation supplies etc.

1. SIEMON
2. CHATSWORTH PRODUCTS (CPI)
3. B-LINE
4. WBT TRAY
5. PANDUIT
6. CORNING CABLE STSYEMS
7. HELLERMANN-TYTON

SECTION 311000 - SITE CLEARING

1.1 SUMMARY

1. Clearing and grubbing.
2. Stripping and stockpiling topsoil.
3. Removing above- and below-grade site improvements.
4. Disconnecting, capping or sealing, and removing site utilities.
5. Temporary erosion and sedimentation control measures.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the Storm Water Pollution Prevention Plan (SWPPP).

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

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

1.4 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
   1. Arrange with utility companies to shut off indicated utilities.
   2. Owner will arrange to shut off indicated utilities when requested by Contractor.

B. Excavate for and remove underground utilities indicated to be removed.

1.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
   1. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

1.6 TOPSOIL STRIPPING

A. Include sod and grass with stripping topsoil.

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

C. Stockpile topsoil materials as shown on the Civil Construction Documents.

1.7 SITE IMPROVEMENTS

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

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1.8 DISPOSAL

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

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

1.1 SUMMARY

A. This Section includes the following:
   1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
   2. Excavating and backfilling for buildings and structures.
   3. Drainage course for slabs-on-grade.
   4. Subbase course for concrete walks and pavements.
   5. Subbase and base course for asphalt paving.
   6. Subsurface drainage backfill for walls and trenches.
   7. Excavating and backfilling for utility trenches.
   8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include the following:
   1. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
   2. Division 31 Section "Dewatering" for lowering and disposing of ground water during construction.
   3. Division 31 Section "Excavation Support and Protection" for shoring, bracing, and sheet

1.2 SUBMITTALS

A. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.3 QUALITY ASSURANCE

A. Blasting: No blasting allowed

B. Geotechnical Testing Agency Qualifications: Owner will provide an independent qualified testing agency to conduct soil materials, concrete, and various other testing required on the project.

1.4 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner’s Project Manager and then only after arranging to provide temporary utility services according to requirements indicated.

   1. Notify Owner’s Project Manager not less than three days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner’s Project Manager's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

1.5 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, free of rock or gravel larger than 2.5 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487.

1. Unsatisfactory soils also include satisfactory soils not maintained within 3 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

1.6 SUBGRADE INSPECTION

A. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner's soil testing organization, without additional compensation.

1.7 STORAGE OF SOIL MATERIALS

A. Place borrow soil materials and excavated satisfactory soil materials without intermixing, as directed by Contractor Project Manager. Place, grade, and shape material to drain surface water. Cover to prevent windblown dust.

1. Place soil materials away from edge of excavations. Do not store within drip line of remaining trees.

END OF SECTION 312000

SECTION 312319 - DEWATERING

1.1 SUMMARY

A. Section includes construction dewatering.

1.2 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

1.3 SUBMITTALS

A. Other Informational Submittals:

1. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.4 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Architect's, Construction Manager's, and Owner's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering.

2. The geotechnical report is referenced in the Project Manual.

C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

1.5 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

1.6 FIELD QUALITY CONTROL

A. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

END OF SECTION 312319

SECTION 315000 – EXCAVATION SUPPORT AND PROTECTION

1.1 SUMMARY

A. Section includes temporary excavation support and protection systems.

1.2 PERFORMANCE REQUIREMENTS

A. Lay back trenches and excavation as required for site safety.

1.3 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to excavation support and protection system including, but not limited to, the following:

a. Geotechnical report.
b. Existing utilities and subsurface conditions.
c. Proposed excavations.
d. Proposed equipment.
e. Monitoring of excavation support and protection system.
f. Working area location and stability.
g. Coordination with waterproofing.
h. Abandonment or removal of excavation support and protection system.

1.4 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Architect's, Construction Manager's, and Owner's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from the data.

1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
2. The geotechnical report is referenced elsewhere in the Project Manual.

C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

1.5 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

1.6 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlaying construction and abandon remainder.
2. Fill voids immediately with approved backfill compacted to density specified in Division 31 Section "Earth Moving."
3. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

B. Leave excavation support and protection systems permanently in place.

END OF SECTION 315000

SECTION 321216 – PLANT MIX ASPHALT PAVING

1.1 SUMMARY

A. Section Includes:
   1. Hot-mix asphalt paving.
   2. Pavement-marking paint.

B. DFCM Design Manual, University of Utah Supplement, September 21, 2012

C. 2010 ADA Standards for Accessible Design

D. Most recently published version of the American Public Works Association (APWA) Standard Specifications and Standard Plans.

E. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 50 deg F for oil-based materials, 55 deg F for water-based materials, and not exceeding 95 deg F.

1.2 AGGREGATES

A. Coarse Aggregate: ASTM D 5821, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

B. Fine Aggregate: ASTM C 142: 2 percent maximum passing the No. 4 Sieve.

C. Mineral Filler: ASTM D 242, rock or slag dust, hydraulic cement, or other inert material.

1.3 ASPHALT MATERIALS

A. Asphalt Binder: Petroleum asphalt that complies with Table 2 of ASTM D 3381 except as follows:
   1. Replace ductility, ASTM D113, at 77 deg F with ductility at 39.2 deg F. AC-20 greater than 5.
   2. Delete the loss on heating requirement on residue from “Thin-Film Oven Test”

B. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

1.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
   1. Air void target is 4 percent
   2. Density target I mix design is 98 percent of maximum theoretical specific gravity (ASTM D2041)
   3. Stability is a minimum of 1200.
   4. Voids in Mineral Aggregate (VMA) is 14.

5. Flow,in 0.01 inch units is 10-18.
6. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
7. Base Course: 1 inch complying with composition, grading and tolerance requirements in ASTM D 3515.
8. Surface Course: 3/4 inch complying with composition, grading and tolerance requirements in ASTM D 3515.

1.5 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch
2. Surface Course: 1/8 inch
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

C. Pavement Tolerances in ADA paths of travel: Use additional care in smoothing asphalt surface in areas designated on plans as ADA paths of travel. Acceptance of slopes in ADA areas should be determined by using a 4-foot straightedge applied transversely and longitudinally to paved areas. Slopes must not exceed maximums established in the 2010 ADA Standards for Accessible Design in any direction for any area of measure.

1.6 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.

B. Allow paving to age for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

END OF SECTION 321216

SECTION 321313 - CONCRETE CURB, GUTTER, SIDEWALK & CAST-IN-PLACE DRAINAGE STRUCTURES

1.1 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Parking lots.
   2. Curbs and gutters.
   3. Walkways.

1.2 SUBMITTALS

A. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

   1. Cementitious materials.
   2. Steel reinforcement and reinforcement accessories.
   3. Fiber reinforcement.
   4. Admixtures.
   5. Curing compounds.
   6. Applied finish materials.
   7. Bonding agent or epoxy adhesive.
   8. Joint fillers.

1.3 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

   1. Use flexible or curved forms for curves with a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1.4 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

B. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.

C. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

D. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60, plain steel bars.

E. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

G. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

1.5 CONCRETE MATERIALS

A. Cementitious Material: Use one of the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with: Twin Falls Technical Specifications Section 414.02, Materials.

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

1.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1 Class B.

1.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:

1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45 or 0.50.
3. Slump Limit: 2 inches, plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 6-1/2 percent plus or minus 1.5 percent for 1-1/2-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range, water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements as follows:

1. Fly Ash or Pozzolan: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.
3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

G. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd.

H. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

1.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

1.1 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.

B. DFCM Design Manual, University of Utah Supplement, September 21, 2012

1.2 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: Match Architect's samples

1.3 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.

B. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.

C. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

1.4 HOT-APPLIED JOINT SEALANTS

A. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.

B. Hot-Applied, Single-Component Joint Sealant for Concrete and Asphalt: ASTM D 6690, Types I, II, and III.

1.5 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

D. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

1.6 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

1.7 PAVEMENT-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within cement concrete pavement.

1. Joint Location:

a. Expansion and isolation joints in cast-in-place concrete pavement.
b. Contraction joints in cast-in-place concrete slabs.
c. Other joints as indicated.

2. Silicone Joint Sealant for Concrete: Single component, self-leveling
3. Hot-Applied Joint Sealant for Concrete: Single component
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range

B. Joint-Sealant Application: Joints between cement concrete and asphalt pavement

1. Joint Location:

a. Joints between concrete and asphalt pavement.
b. Joints between concrete curbs and asphalt pavement.
c. Other joints as indicated.

2. Hot-Applied Joint Sealant for Concrete and Asphalt: Single component
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range

END OF SECTION 321373

SECTION 321400 - UNIT PAVERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Ungrouted mortarless concrete pavers installed in sand setting bed per AWPA 32 14 13 standards

1.2 UNIT PAVERS

A Holland Concrete Pavers

1. Size: 4-inches x 8-inches x 60 mm thick.
2. Color: as selected by Architect.
3. Manufacturer: Lehi Block, Buehener Block, or Wisco.

1.3 UNGROUTED MORTARLESS SETTING MATERIALS FOR PAVERS

A. Sand for Joints and Leveling Course: Fine aggregate complying with ASTM C 33 and the following:

Sieve Size	Percent Passing
3/8 in.	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

B. Road Base material: Aggregate Base Course Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-inch sieve and not more than 15 percent passing a No. 200 sieve. Sand Equivalent of no less than 35.

C. Geotextile: Nonwoven geotextile with a permeability rating 10 times greater than that of soil on which paving is founded and an AOS (apparent opening size) small enough to prevent passage of fines from leveling course into graded aggregate of base course below.

D. Sand Stabilizer for bed and joint sand materials.

END OF SECTION

SECTION 321443 PERMEABLE UNIT PAVING

1.01 SUMMARY

A. Section Includes
   1. Permeable interlocking concrete pavers.
   2. Crushed stone bedding material.
   3. Open-graded subbase aggregate.
   4. Open-graded base aggregate.
   5. Bedding and joint/opening filler materials.
   6. Edge restraints.
   7. Geotextiles.

1.02 PAVING UNITS

A. Manufacturer: Belgard – Aqua Roc
   Pavestone – UNI ECOLOC
   Hanover Architectural Products – Aqua-Loc

B. Permeable Interlocking Concrete Paver Units:
   1. Paver Type: Specify name of product group, family, series, etc..
      a. Material Standard: Comply with ASTM C 936.
      b. Color and finish: Specify color. Specify finish.
      c. Color Pigment Material Standard: Comply with ASTM C 979.

1.03 CRUSHED STONE FILLER, BEDDING, BASE AND SUBBASE

A. Crushed stone with 90% fractured faces, LA Abrasion < 40 per ASTM C 131, minimum CBR of 80% per ASTM D 1883.
B. Do not use rounded river gravel for vehicular applications.
C. All stone materials shall be washed with less than 2% passing the No. 200 sieve.
D. Joint/opening filler, bedding, base and subbase: conforming to ASTM D 448 gradation as shown in Tables 1, 2 and 3 below:

Table 1
ASTM No. 8 Grading Requirements
Bedding and Joint/Opening Filler

Sieve Size	Percent Passing
12.5 mm (1/2 in.)	100
9.5 mm (3/8 in.)	85 to 100
4.75 mm (No. 4)	10 to 30
2.36 mm (No. 8)	0 to 10
1.16 mm (No. 16)	0 to 5

Table 2
ASTM No. 57 Base
Grading Requirements

Sieve Size	Percent Passing
37.5 mm (1 1/2 in.)	100
25 mm (1 in.)	95 to 100
12.5 mm (1/2 in.)	25 to 60
4.75 mm (No. 4)	0 to 10
2.36 mm (No. 8)	0 to 5

Table 3
Grading Requirement for ASTM No. 2 Subbase

Sieve Size	Percent Passing
75 mm (3 in.)	100
63 mm (2 1/2 in.)	90 to 100
50 mm (2 in.)	35 to 70
37.5 mm (1 1/2 in.)	0 to 15
19 mm (3/4 in.)	0 to 5

1.04 ACCESSORIES

A. Provide accessory materials as follows:

1. Edge Restraints
   a. Manufacturer: [Specify manufacturer.].
   b. Material: [Pre-cast concrete] [Cut stone] [Concrete].
   b. Material Standard: [Specify material standard.].

2. Geotextile:

END OF SECTION

SECTION 321723 - PAVEMENT MARKING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of furnishing and applying paint on pavement surfaces, in the form of traffic lanes, parking bays, areas restricted to handicapped persons, crosswalks, and other detail pavement markings, in accordance with the details as shown or as prescribed by the Resident Engineer. Conform to the Manual on Uniform Traffic Control Devices for Streets and Highways, published by the U.S. Department of Transportation, Federal Highway Administration, for details not shown.

B. Master Painters Institute (MPI):
No. 97-2002.....Latex Traffic Marking Paint

1.2 PAINT

Paint for marking pavement (parking lot and zone marking) shall conform to MPI No. 97
Paint for obliterating existing markings shall conform to Fed. Spec. TT-P-1952D. Paint shall be in containers of at least 18 L (5 gallons). A certificate shall accompany each batch of paint stating compliance with the applicable publication.

1.3 PAINT APPLICATOR

Apply all marking by approved mechanical equipment. The equipment shall provide constant agitation of paint and travel at controlled speeds. Synchronize one or more paint "guns" to automatically begin and cut off paint flow in the case of skip lines. The equipment shall have manual control to apply continuous lines of varying length and marking widths as shown. Provide pneumatic spray guns for hand application of paint in areas where a mobile paint applicator cannot be used. An experienced technician that is thoroughly familiar with equipment, materials, and marking layouts shall control all painting equipment and operations.

1.4 SANDBLASTING EQUIPMENT

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall furnish not less than 0.08 m^3/s (150 cfm) of air at a pressure of not less than 625 kPa (90 psi) at each nozzle used.

E N D OF SECTION

SECTION 328400 - IRRIGATION SYSTEMS

1.1 SUMMARY

A. This Section includes valves, piping, sprinklers, specialties, accessories, controls, and wiring for irrigation systems.

B. Create a site irrigation water use budget based upon location and site conditions per EPA Water Sense criteria for monthly use at or below levels established by the Water sense tool.

1.2 DEFINITIONS

A. Piping sizes used in this Section are normal pipe size (NPS) in inches.

B. Supply Piping: Piping from water source to connection to irrigation system pressure piping. Piping is under same pressure as water supply.

C. Pressure Piping: Piping downstream from supply piping to and including control valves. Piping is under irrigation system pressure.

D. Circuit Piping: Piping downstream from control valves to irrigation system sprinklers, emitters, devices, and drain valves. .

E. Control Valve: Manual or automatic (electrically operated) valve for control water flow to irrigation system zone, including isolation or zone valves.

F. Drain Piping: Downstream from circuit or pressure piping drain valves. Piping is not under pressure.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Minimum Water Coverage: Not less than:

1. Turf Areas: 100 percent.
2. Other Planting Areas: 100 percent.

B. Components and Installation: Capable of producing piping systems with the following minimum working pressure ratings except where indicated otherwise.

1. Pressure Piping: 150 psig (1035 kPa).
2. Circuit and Drain Piping: 100 psig (690 kPa).

1.4 SUBMITTALS

A. Product data including pressure rating, rated capacity, settings, and electrical data of selected models for the following:

B. Wiring diagrams for electrical controllers, valves, and devices.

C. Maintenance data for inclusion in “Operating and Maintenance Manual”

D. Irrigation Schedule: A monthly Irrigation Schedule shall be prepared that covers the initial 120-day plant establishment period

The irrigation schedule shall rely on the estimated landscape water use calculations and shall be adjusted as necessary for irrigation efficiency, soil conditions, slope, and microclimate conditions. (See Appendix B)

E. Water Use Efficiency Review: Following construction a Water Use Efficiency Review (Audit) will be conducted by a certified Landscape Irrigation Auditor. The auditor shall be independent of the contractor, design firm and owner / developer of the project.

F. Qualification Data: Certification of The Certified Irrigation Contractor employed by the Irrigation System installer.

1.5 QUALITY ASSURANCE

A. Comply with requirements of utility supplying water for prevention of backflow and back siphonage.

B. Installer Qualifications: Engage an experienced installer who has completed minimum of 6 irrigation systems similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

The successful contractor shall, at the time of bid and award, have at least one registered CIC (Irrigation Association Certified Irrigation Contractor) with a current certification and who is a direct employee of the Irrigation Contractor. The CIC shall meet with the University Landscape Maintenance Department on site at least weekly to review the progress of the Work.

1.6 SEQUENCING AND SCHEDULING

A. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shutoff with Owner.

1.7 WARRANTY/GUARANTEE

A. During the period of one (1) year from and after the final acceptance of the completed irrigation system, the Contractor shall at his own expense, make all needed repairs or replacement due to defective workmanship or materials which in the judgment of the Owner or Owner's representative, shall become necessary during such period.

B. During the guarantee period, the Contractor will drain the system in the fall and put the system back into operation in the Spring. This work shall be done in the presence of the Owner's representative and maintenance personnel.

1.8 RECORD DRAWINGS:

A. Any deviation from plan layout should be indicated on the final "Record" Drawings

B. Record Drawings shall be furnished to the Landscape Architect at the time of Substantial Completion Inspection before a letter of Substantial Completion for the irrigation sprinkler system will be issued.

C. The Contractor shall supply the Landscape Architect with record drawing information in AutoCAD format before final acceptance of the irrigation system.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide the following:

1. Pressure Regulators
2. Gate Valves for Underground Installation:
3. Corporation Stops for Underground Installation
4. Valves for Aboveground and Pit Installation
   a. Grinnell Supply Sales Co., Grinnell Corp.
   b. Nibco, Inc.
   c. Stockham Valves & Fittings, Inc.
   d. Walworth Co.
   e. Watts Regulator Co.
5. Automatic Control Valves
   a. Rain Bird Sprinkler Mfg. Corp. 1 inch
   b. Toro Co. 1 ¼ inch to 3 inches
6. Control Valve Boxes
   a. Ametek by Plymouth Products Div., AMETEK
   b. Brooks Products, Inc., Polyplastics Div.
   c. Carson - Oldcastle.
7. Quick Couplers
   a. Rain Bird Sprinkler Mfg. Corp.
   b. Toro Company
8. Sprinklers
   a. Toro Company
   b. Rain Bird Sprinkler Mfg. Corp.
9. Controllers
   a. Rain Bird Sprinkler Mfg. Corp.

2.2 PIPES AND TUBES

A. Polyvinyl Chloride (PVC) Plastic Pipe: ASTM D 1785, PVC 1120, Schedule 40, 160 psig (1100 kPa) minimum pressure rating for 3-inch (100-mm) and smaller sizes, with plain, threaded or bell ends.

1. PVC Socket Fittings: Schedule 40: ASTM D 2466.

B. Polyvinyl Chloride (PVC) Plastic Pipe: ASTM D 1785, PVC 1120 compound, Schedule 80.

1. PVC Socket Fittings: Schedule 80: ASTM D 2467.
2. PVC Threaded Fittings: Schedule 80: ASTM D 2464.

C. PVC, Pressure-Rated Pipe: ASTM D 2241, PVC 1120 compound, SDR 21 Bell and Ring for pipe 4” and larger.

D. Flexible Polyethelene Pipe: Rain Bird SPX-Flex-100. Nominal inside dia. 0437’ pressure rated at 80 psi at 110°F.

E. Pipe Sleeves: Pipe sleeves shall be PVC Class 160 of better.

2.3 BACKFLOW PREVENTERS

A. Description: ASSE Standard backflow preventers, of size indicated for maximum flow rate and maximum pressure loss indicated.

1. Working Pressure: 150 psig (1035 kPa) minimum except where otherwise indicated.
2. 2-inches (DN 50) and Smaller: Bronze body with threaded ends.
3. 2½-inches (DN 65) and Larger: Bronze, cast-iron, steel or stainless-steel body with flanged ends.

B. Reduced-Pressure-Principle Backflow Preventer: ASSE 1013, with (OS&Y) gate valves on inlet and outlet and strainer on inlet. Include test cocks and pressure differential relief valve with ASME A112.1.2 air-gap fitting located between two positive-seating check valves for continuous pressure application.

1. Pressure Loss: 15 psig (103 kPa) maximum, through middle third of flow range.

2.4 VALVES

A. General: Valves are for general-duty and underground applications.

B. Non rising Stem Gate Valves 3-inches (DN 80) and Larger: AWWA C500, cast-iron double disc, bronze disc and seat rings or AWWA C509, resilient seated;

C. Plastic Valves: Polyvinyl Chloride (PVC) Plastic, with 150 psig (1035 kPa) minimum pressure rating, ends compatible to piping where valve is to be installed, and tee handle.

D. Ball Valves: Ball valves shall be solid bronze meeting Federal Specification WW-V-54, CLASS A, TYPE I. Size shall be the same size as the main line on which it is installed. Valves shall be installed on the up-stream side of the electric remote control valve manifold and in the same valve box. NOTE: Only one (1) ball valve required per manifold.

E. Stop and Waste Valves: Stop and waste valves shall be solid bronze meeting Federal Specification WW-V-54, CLASS A, TYPE I. Provide an 8" round valve box over the PVC stand pipe.

F. Drain Valves: All drain valves shall be ¾" brass full turn ball cocks and installed as per details on the Drawings. Valves shall be tested for 150 psi working pressure. This valve is to be installed on mainlines only.

G. Master Valve: The master valve and flow sensing device shall be a single, combined, unit with the capability of adding pressure regulation where needed.

H. Hose Bibs: Install one hose bib per group of valves. Hose Bib shall have inverted nose.

2.5 CONTROL VALVES

A. Description: Manufacturer's standard control vales for circuits, of type and size indicated, and as follows:

1. Provide cast-bronze bodies, unless otherwise indicated.
2. Manual Control Valves: MSS SP-80, Class 125, globe valves.
3. Install University of Utah Landscape maintenance department approved valve tags on each valve indicating the appropriate controller and station number.

B. Control Valve Boxes: Carson Brooks Polyethylene (PE), acrylonitrile-butadiene-styrene (ABS), fiberglass, polymer concrete, or precast concrete box and cover. Size as required for application.

1. Drainage Backfill: Cleaned 1" gravel or crushed stone, 6" deep.
2. Foundation: Provide a pressure treated foundation of 4"x4" lumber or brick.

Valve boxes shall be of sufficient size to house electric remote control valves Limit the number valves per valve box. The maximum number allowed in each box is:

VALVE BOX SIZE	ELECTRIC VALVE SIZE AND QUANTITY
tandard Valve Box	One Valve per Box
Jumbo Valve Box	One 2" Valve, or Two 1-1/2" Valves, or Two 1" Valves
Little Giant	Two 2" Valves, or Three 1-1/2" Valves, or Three 1" Valves
Giant	Three 2" Valves, or Four 1-1/2" Valves, or Four 1" Valves

2.6 SPRINKLERS

A. Description: Manufacturer's standard sprinklers designed to provide uniform coverage over entire area of spray shown on Drawings at available water pressure, as follows:

1. Housings: plastic, except where material is specified.

2. Pop-up, Spray: Fixed pattern, with screw-type flow adjustment and stainless steel retraction spring.
3. Pop-up, Rotary Spray: Gear drive, full-circle and adjustable part-circle type.
4. Bubblers: Fixed pattern, with fixed flow, non-adjustable and pressure compensating.

2.7 AUTOMATIC CONTROL SYSTEM

A. Description: Low-voltage controller system made for control of irrigation system automatic control valves. Controller operates on 120 volts a.c. building power system, provides 24 volts a.c. power to control valves.

B. Exterior Control Enclosures: Weatherproof enclosure with locking cover and two matching keys. Enclosure construction complies with NFPA 70 and NEMA 250, Type 4, and includes provision for grounding.Provide both Ethernet and radio connection to central control.

1. Material: Enameled-steel, sheet metal.

C. Wiring: UL 493, solid copper conductor, insulated cable, suitable for direct burial.

1. Feeder Circuit Cables: Type UF, No. 14 AWG minimum, between valves and controllers.
2. Control Wiring: Rain Bird, MaxiCom approved signal communication wire, Type PE39.

2.8 SLEEVES

A. Sleeve Tape: Provide “Deep~1” Sleeve Magnets for marking irrigation sleeves.

2.9 IDENTIFICATION

A. Refer to Division 2 Section “Earthwork” for plastic underground warning tapes.

2.10 THRUST BLOCKS

A. All main lines shall have a thrust block of poured concrete installed at each change of direction. The thrust block shall be of sufficient size for the pipe involved and rest on undisturbed ground. Construct as follows:

PART 3 - EXECUTION

3.1 EXAMINATION

A. All pipe must be inspected by the University Irrigation Shop before it can be buried. When pipe has passed inspection, the University’s representative will give the Contractor a PIPE INSPECTION FORM indicating which areas of pipe have passed. If pipe has not passed inspection, the University reserves the right to have the pipe dug up to insure it meets the standards noted herein.

3.2 PREPARATION

A. Set stakes or flags to identify proposed sprinkler locations. Obtain Architect's approval before excavation.

3.3 PIPING APPLICATIONS

A. Pressure Piping Underground: Use the following:

1. 3-inches (DN 80) and Smaller: ASTM D 1785, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type pipe fittings; and solvent-cemented joints.

2. 4-inches (DN 80) and Larger: ASTM D 2241, Class 200, polyvinyl chloride (PVC) plastic pipe; with gasketed bell ends.

B. Circuit Piping: Use the following:

1. All Sizes: ASTM D 1785, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type fittings; and solvent-cemented joints.

C. Branches and Offsets at Sprinkler and Devices: ASTM D 1785, Schedule 80, polyvinyl chloride (PVC) plastic pipe with threaded ends; ASTM D 2464, Schedule 80, PVC plastic, threaded fittings; and threaded joints.

D. Flexible Polyethylene Pipe: Flexible poly (funny or swing pipe) can be installed only on heads with ¾" or smaller inlets . Lengths cannot exceed 2' or 6 gpm.

E. Sleeves: All sleeves shall be a minimum of 2" diameter. Sleeves shall be at least two sizes larger than the outside diameter of the piping contained in the sleeve.

1. ASTM D 1785, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type fittings; and solvent-cemented joints.

2. All sleeves shall be marked by duct taping a "Deep~1" Sleeve Magnate on both ends of the sleeve at all locations.

3.4 JOINT CONSTRUCTION

A. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.

3.5 PIPING SYSTEMS – COMMON REQUIREMENTS

A. General Locations and Arrangements: Drawings indicated general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, and in other design considerations. 1 inch minimum pipe size required.

B. Install piping at a uniform slope of 6-inches per 100-feet (1:200) minimum, down to drain points.

C. Install piping free of sags and bends.

D. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

F. Piping Connections: Except as otherwise indicated make piping connections as specified below.

1. Install unions, in piping 2-inches (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment having 2-inch (DN 50) or smaller threaded pipe connection.
2. Install flanges, in piping 2½-inches (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
3. Install dielectric fittings to connect piping of dissimilar metals.

3.6 TRENCHES:

A. Trenches shall be dug as wide and deep as necessary to properly place the sprinkling system according to the requirements herein. Any rock uncovered in this excavation shall not be left in the backfill. All excess rock shall be removed from the site by this Contractor and legally disposed of off the property. All trenches shall be backfilled and compacted to insure no settling of the surface, after the lawn is planted.

B. If backfill soil is rocky or lumpy, protect the pipe and the pipe conduit with 8” of sand or loose, rock free, soil under, over and on sides of pipe. Avoid putting large rocks against pipe during backfilling operation. See detail.

C. All trenches must be compacted to 90% in 6” lifts and watered in. Lines from control valves shall be installed after topsoil is in place and properly graded.

D. This Contractor, in placing the sprinkling lines, etc., may uncover material not suitable for finished grading. This material shall be removed from the site by this Contractor. After the installation of the lines, the finished grading shall be smoothed over and restored to its original condition, using additional topsoil at this Contractor's expense, if this is necessary. The upper 6” of topsoil removed in the excavation of trenches for pipeline shall be conserved and kept separate from subsoil and reinstalled without mixing with other soil.

E. Trenches where more than one pipe is to be installed, a distance of 6” is to be maintained between each pipe. No exceptions.

F. Trenches for, or with wiring shall be wiring shall be a minimum of 12” deep. Wiring shall be buried under pipe with a separation of no fewer than 3”

G. All trenches are to be 12” away from all curbs, buildings and sidewalks. No exceptions.

3.8 PIPING INSTALLATION

A. All pipe must be inspected by the University Irrigation Shop before it may be buried. When the pipe has passed inspection, the University representative will give the Contractor a pipe inspection form indicating which areas of pipe have passed. If pipe has not passed inspection, the University reserves the right to have the pipe exposed to insure that it meets the standards noted herein.

B. Minimum Cover: Provide following minimum cover over top of buried piping:

1. Pressure Piping: Greater depth of minimum of 18-inches (600 mm) below finished grade.
2. Circuit Piping: 15-inches (380 mm).
3. Drain Piping: 15-inches (380 mm).
4. Sleeves: 18-inches (600 mm).

C. Install piping under sidewalks and paving in sleeves.

D. All glue joints to be set 24 hours prior to pressurization..

3.9 FLUSHING AND PRELIMINARY TESTING

A. Flash and test each zone after installation of new piping, swing pipe and prefab swing joint, but before installation of heads and before backfilling is complete.

3.10 BACKFLOW PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity per manufacturers recommendations..

3.11 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, following requirements apply:

1. Buried Valves 3-inches (DN 80) and Larger: AWWA, gate valves, non-rising stem, with stem nut and valve box.
2. Buried Valves 2-inches (DN 50) and Smaller: Bronze-body, curb stop, with tee head, service box and shutoff rod.

3.12 VALVE INSTALLATION

A. Valves: Install underground valves in valve boxes or pits.

1. Install all valves with SCH 80 PVC pipe running through the manifold. SCH 80 PVC to extend to the outside edge of the valve box on each side.

3.13 PRESSURE REGULATOR INSTALLATION

A. Install pressure regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet and valved bypass where indicated.

3.14 SPRINKLER INSTALLATION

A. Sprinklers: Flush circuit piping with full head of water and install sprinklers after hydrostatic test is complete.

1. Install lawn sprinklers at manufacturer’s recommended heights.
2. Install shrubbery sprinklers at heights indicated.
3. Locate part-circle sprinklers to maintain a minimum distance of 12-inches (400 mm) from walls and 2-inches (50 mm) from other boundaries, unless otherwise indicated.

3.15 AUTOMATIC CONTROL SYSTEM INSTALLATION

A. Install controllers according to manufacturer’s written instructions and as indicated.

B. Run one extra wire from the adjacent controller to each group of valves for future use and stub into the valve box.

C. Install control wiring in same trench with piping.

3.16 CONNECTIONS

A. Connect piping to sprinklers, devices, valves, control valves, specialties, and accessories.

3.17 FIELD QUALITY CONTROL

A. Testing: Perform hydrostatic test of piping and valves before backfilling trenches. Piping may be tested in sections to expedite work.

1. Cap and subject the piping system to a static water pressure of 50 psig (345 kPa) minimum of 150 psi without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4-hours. Leaks and loss in test pressure constitute defects that must be repaired.
2. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
3. Notify Architect 24 hour in advance of pressure testing so test may be observed.

3.18 CLEANING AND ADJUSTING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

C. Carefully adjust lawn sprinklers so they will be flush with, or not more than ½-inch (13 mm) above, finish grade after completion of landscape work.

D. Adjust settings of controllers and automatic control valves.

3.19 COMMISSIONING

A. Starting Procedures: Follow manufacturer's written procedures.

B. All controller and CCU connections shall be performed by a Rainbird Level III certified technician.

B. Provide irrigation system layout and diagram in CADD format with water zones clearly identified. Layout to be color coded with a maximum of five (5) colors for easy legibility. Record water budget for each irrigation control zone and current settings. Provide laminated copy and mount near controller. Verify location with Architect.

3.20 DEMONSTRATION

A. Demonstrate to Architect that system meets coverage requirements and that automatic controls function properly.

B. Demonstrate to Owner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review operating and maintenance information.

C. Provide 7-days' written notice in advance of demonstration.

D. System Operation Test / Substantial Completion Inspection:

1. Prior to the Substantial Completion Inspection, require the Landscape Irrigation Contractor to coordinate with the University's Irrigation Foreman to subcontract with a Certified Landscape Irrigation Auditor (hereinafter referred to as "CLIA"), at the Contractor's expense. At a pre-approved time and date, the Contractor's CLIA auditor will be directed to a location or locations specified by the University to conduct the audit. The Substantial Completion Inspection will not be authorized until the CLIA report is acceptable to the University.

2. During the Substantial Completion Inspection, the entire system, both electric and hydraulic, will be tested in the presence of the Landscape Architect, the Grounds Department, and the University of Utah Project Manager to insure COMPLETE coverage of all areas to be watered. This test must be performed by using a TRC Commander, hand held radio. Any deficiencies identified at this time will require revisions by the Contractor at the Contractor's expense.

3.21 WINTERIZATION

A. All irrigation systems at the University are winterized October 15th. If the Substantial Completion Certificate has not been issued by this date, it will be the responsibility of the Contractor to winterize the system. All work shall be coordinated with and at the direction of the University Grounds Department Sprinkler Shop to winterize the system. The Contractor shall be responsible to activate the system in the Spring to insure there are no problems. Start up and Shut down will be completed in the presence of the Grounds department Personnel. No Exceptions.

END OF SECTION 328400

SECTION 328401 – DRIP IRRIGATION SYSTEMS

1.1 SUMMARY

A. This Section includes valves, piping, drip tube, sprinklers, specialties and accessories for drip irrigation systems in accordance with University of Utah and DFCM standards.

B. Field verify capacity of the existing irrigation system complete including but not limited to flow, capacity, controller operation and etc.

1.2 DEFINITIONS

A. Piping sizes used in this Section are normal pipe size (NPS) in inches. .

B. Supply Piping: Piping from water source to connection to irrigation system pressure piping.

C. Pressure Piping: Piping downstream from supply piping to and including control valves

D. Circuit Piping: Piping downstream from control valves to irrigation system sprinklers, emitters, devices, and drain valves.

E. Control Valve: Manual or automatic (electrically operated) valve for control water flow to irrigation system zone, including isolation or zone valves.

1.3 SUBMITTALS

A. Product data including pressure rating, rated capacity, settings, and electrical data of selected models

B. Maintenance data for inclusion in “Operating and Maintenance Manual” specified in Division 1 Section “Project Closeout”

1.4 QUALITY ASSURANCE

A. Comply with requirements of utility supplying water for prevention of backflow and backsiphonage.

B. Installer Qualifications: Engage an experienced installer who has completed minimum of 6 irrigation systems similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

The successful contractor shall, at the time of bid and award, have at least one registered CIC (Irrigation Association Certified Irrigation Contractor) with a current certification and who is a direct employee of the Irrigation Contractor. The CIC shall meet with the University Landscape Maintenance Department on site at least weekly to review the progress of the Work.

1.5 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations.

1.6 SEQUENCING AND SCHEDULING

A. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shutoff with Owner.

1.7 EXTRA MATERIALS

Deliver extra materials to Owner. Furnish extra materials matching products installed

1. Dripper Tube: Furnish quantity of units equal to 10% of amount of each type installed.

1.10 WARRANTY/GUARANTEE

A. During the period of one (1) year from and after the final acceptance of the completed irrigation system, the Contractor shall at his own expense, make all needed repairs or replacement due to defective workmanship or materials which in the judgement of the Owner or Owner's representative, shall become necessary during such period

B. During the guarantee period, the Contractor will drain the system in the fall and put the system back into operation in the spring. This work shall be done in the presence of the Owner's representative and maintenance personnel.

1.11 RECORD DRAWINGS:

A. Any deviation from plan layout should be indicated on the final "Record" Drawings. This Contractor shall make an exact measured and dimensioned drawing showing locations of all piping, wiring, control, valves and quick coupler valves.

1.12 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Pressure Regulators
   a. Rain Bird Sprinkler Mfg. Corp.
   b. Netafim USA
2. Automatic Control Valves

a. Rain Bird Sprinkler Mfg. Corp. (No Substitute)

3. Control Valve Boxes
   a. Ametek by Plymouth Products Div., AMETEK
   b. Brooks Products, Inc., Polyplastics Div.
   c. Carson - Oldcastle.

4. Sprinklers
   a. Rain Bird Sprinkler Mfg. Corp.
   b. Toro Company

5. Filters
   a. Rain Bird Sprinkler Mfg. Corp.
   b. Netafim USA.

6. Flush Valves
   a. Rain Bird Sprinkler Mfg. Corp.
   b. Netafim USA.

7. Air/Vacuum Relief Valves
   a. Rain Bird Sprinkler Mfg. Corp.
   b. Netafim USA.

8. Pipe
   a. Pacific Western Extruded Plastics Co.
   b. Eagle Pacific Industries, Inc.
   c. J-M Manufacturing Company, Inc.

2.2 JOINING MATERIALS

A. Solvent Cement: ASTM F656 primer and ASTM D2564 solvent cement in color other than orange.

B. 17 mm Drip Fittings: Connections shall be made with approved Rainbird or Netafim Techline fittings.

2.3 VALVES

A. General: Valves are for general-duty and underground applications. Refer to “Valve Applications” Article for locations of various valve types specified in this Article. Refer to “Control Valves” Article for control valves and accessories and “Backflow Preventers” Article for backflow preventer valves.

B. Ball Valves: Ball valves shall be solid bronze meeting Federal Specification WW-V-35C, TYPE II, COMPOSITION: BZ, STYLE: 3. Size shall be the same size as the main line on which it is installed. Valves shall be installed on the up-stream side of the electric remote control valve manifold and in the same valve box. NOTE: Only one (1) ball valve required per manifold.

2.4 CONTROL VALVES

A. Description: Manufacturer’s standard control vales for circuits, of type and size indicated, and as follows:

   1. Provide cast-bronze bodies, unless otherwise indicated.

B. Control Valve boxes: Polyethylene (PE),

1. Drainage Backfill: Cleaned gravel or crushed stone, graded form 3-inches (75 mm) maximum to ¾-inch (19 mm) minimum.

2. Valve boxes shall be of sufficient size to house two (2) electric remote control valves with unions, and still allow room for maintenance without having to excavate or perform similar operations.

2.5 SPRINKLERS

A. Description: Manufacturer's standard sprinklers designed to provide uniform coverage over entire area of spray shown on Drawings at available water pressure, as follows:

1. Pop-up, Spray: Fixed pattern, with screw-type flow adjustment and stainless steel retraction spring.

2.6 DRIP LINE AND INTEGRAL DRIPPER LINE COMPONENTS

A. The dripper line shall be pressure compensating dripper line 17mm, dripper line

1. 17mm fittings: All dripline connections shall be made with approved insert fittings.
2. Soil Staples (TLS6):
3. Pressure Regulator:
4. Disc Filter:

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Use pipe, tube, fittings, and joining methods according to the manufacturer's specification and the following applications.

B. Circuit Piping: Use the following:

1. 3-inches (DN 80) and Smaller: ASTM D 2241, SDR 17, polyvinyl chloride (PVC) plastic pipe; ASTM D 2467, Schedule 40, PVC plastic, socket-type pipe fittings; and solvent-cemented joints.

C. Branches and Offsets at Sprinkler and Devices: ASTM D 1785, Schedule 80, polyvinyl chloride (PVC) plastic pipe with threaded ends; ASTM D 2464, Schedule 80, PVC plastic, threaded fittings; and threaded joints.

D. Sleeves: ASTM D 1785, Class 200 , polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type fittings; and solvent-cemented joints.

3.2 PIPING SYSTEMS – COMMON REQUIREMENTS

A. General Locations and Arrangements: Drawings indicated general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, and in other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.

B. Install piping at a uniform slope of 6-inches per 100-feet (1:200) minimum, down to drain points.

C. Install components having pressure rating at 150 psi or greater .

D. Install piping free of sags and bends.

E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

F. Install fittings for changes in direction and branch connections.

G. Piping Connections: Except as otherwise indicated make piping connections as specified below.

1. Install unions, in piping 2-inches (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment having 2-inch (DN 50) or smaller threaded pipe connection.

3.3 TRENCHES:

A. Trenches shall be dug as wide and deep as necessary to properly place the sprinkling system. Any rock uncovered in this excavation shall not be left in the backfill.

B. If backfill soil is rocky or lumpy, protect the pipe and the pipe conduit with 8” of sand or loose, soil

C. All trenches must be compacted to 90% in 6” lifts and watered in. Lines from control valves shall be installed after topsoil is in place and properly graded.

D. Trenches where more than one pipe is to be installed, a distance of 6” is to be maintained between each pipe.

E. All trenches are to be 12” away from all curbs, buildings and sidewalks. <u>No exceptions</u>.

3.4 PIPING INSTALLATION

A. Minimum Cover: Provide following minimum cover over top of buried piping:
1. Lateral Line Piping: 12”.
2. Main Line Pipe: 18”
3. Inline Emitter Tubing: 2”

B. Install piping under sidewalks and paving in sleeves.

3.5 DRIP LINE INSTALLATION

A. Install all drip line as indicated on drawings. Use only Teflon tape on all threaded connections.

B. When installing drip line on-surface, install soil staples:

C. Install two operation flags, model 10-F-01 per each drip line valve. Netafim operation flags shall be used to notify and indicate operation of the drip system.

D. Thoroughly flush all water lines before installing valves, emitters and other hydrants.

E. Test in accordance with Manufacturers recommendations.

3.6 VALVE INSTALLATION

A. Valves: Install underground valves in valve boxes or pits.

1. Install valves and polyvinyl chloride (PVC) pipe with restrained, gasketed joints.

B. Control and Ball Valves: All of the devices in the manifold shall be space such that all of the devices are fully operational and accessible for maintenance purposes. Manifold shall include the following devices, in this order:

1. Brass Isolation Valve

2. Automatic valve of the appropriate size.

3. Manifold union.

4. Disc filter with 140 mesh disc filter rings, of appropriate size

5. Inline pressure regulator valve of appropriate size and flow.

6. Manifold union.

3.7 SPRINKLER INSTALLATION

A. Sprinklers: Flush circuit piping with full head of water and install sprinklers after hydrostatic test is complete.

7. Install lawn sprinklers at manufacturer's recommended heights.
8. Locate part-circle sprinklers to maintain a minimum distance of 12-inches (400 mm) from walls and 2-inches (50 mm) from other boundaries, unless otherwise indicated.

3.8 DRAINS:

A. All lines shall be sloped to drain

3.9 DRIP FILTERS:

A. Filters shall be installed immediately after the electric valve and before the pressure regulator.

3.10 DRIP SYSTEM PRESSURE REGULATORS:

A. Due to the high flows involved with a 17mm system system compared to other drip systems it is important to only use the high flow (20 GPM) 45 PSI regulators. The regulators shall be installed after the filters and must not be buried, but shall be accessible for inspections and maintenance.

3.10 FIELD QUALITY CONTROL

A. Testing: Perform hydrostatic test of piping and valves before backfilling trenches. Piping may be tested in sections to expedite work.

1. Cap and subject the piping system to a static water pressure of 50 psig (345 kPa) above the operating pressure, but not less than 150 psig without exceeding pressure rating of piping system materials
2. Notify Architect and University Landscape Maintenance Department Representative 24 hours in advance of pressure testing so test may be observed.

3.11 CLEANING AND ADJUSTING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.12 COMMISSIONING

A. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturers, proceed as follows:

3. Verify that specialty vales and their accessories have been installed correctly and operate correctly.
4. Verify that specified test of piping are complete.
5. Check that sprinklers and devices are correct type.
6. Check that damaged drip tube , emitters and devices have been replaced with new materials.
7. Energize circuits to electrical equipment and devices.
8. Adjust operating controls.

3.13 DEMONSTRATION

B. Demonstrate to Architect that system meets coverage requirements and that automatic controls function properly.

C. Demonstrate to Owner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review operating and maintenance information.

D. Provide 7-days' written notice in advance of demonstration.

END OF SECTION 328401

SECTION 329301 – LANDSCAPE PLANTING

1.1 SUMMARY

A. The extent of the landscaping development work is shown on the drawings and in schedules. This work includes:

1. Obtaining and paying for permit fees, inspections and tests required for the installation of landscape planting.
2. Providing and placement of all plant material, topsoil, light weight aggregate soil mulch, sod, seed, miscellaneous materials and maintenance of landscape planting and associated guarantees.
3. Provide maintenance Service during Warranty Period.
4. Attendance at Pre-Construction Conference

1.2 QUALITY ASSURANCE

A. The DFCM and the University reserves the right to perform site inspections at any time before, during or after the landscape installation, and to require corrective measures if requirements of the specification are not met.

B. Plants shall conform to names indicated on the drawings and plant list and to the nomenclature listed in the American Joint Committee on Horticultural Nomenclature's "Standardized Plant Names", latest edition.

C. Size, quality, handling, planting and maintenance of plant materials shall be in accordance with "American Standard for Nursery Stock", ANSI Z60-1996, American Association of Nurserymen, Inc. Minimum acceptable sizes of plants, measured before pruning with branches in normal position, shall conform to measurements specified in the Plant Materials Key.

D. Plants shall be subject to the University Project Manager and Landscape Architect's inspection and approval at place of growth or upon delivery for conformity to specification requirements. Such approval shall neither preclude right of rejection upon delivery at the site or during progress of work, nor right of rejection at the site due to damage suffered in handling or transportation. Inspection of plants by the Landscape Architect before digging shall be at the option and expense of the Owner.

1. All plant material will be inspected again at time of final inspection and once again at the end of the warranty period.
2. Any plant material found to be unacceptable at or during any onsite observation or inspection shall be immediately removed and replaced.

3. A tree or shrub planted in a single location may be removed and replaced more than one time during the establishment, maintenance, maintenance service and warranty periods.

E. Unauthorized substitutions of plant material will not be accepted. All substitution requests must be made in writing and preferably before the bid due date.

F. Contractor will provide and pay for materials testing.

G. Test reports: Provide the following information:

1. Topsoil:

2. Compost:

H. Landscape work shall be done by a single firm specializing in landscape construction work with minimum five (5) years' experience completing projects of similar size and complexity.

1. Contractor to provide list of past projects completed during last three (3) years at time of first bid proposal.

1.3 SUBMITTALS

A. General: Submit each item in this article and for each item listed in Part 2 – Materials for review and approval according to the General Conditions of the Contract and Specifications - Division 1.

B. Submit Certificate of Inspection of plant material by state or federal authorities.

C. Submit commercial soils test with material test reports and soil nutrient additive recommendations.

D. Submit a label from the manufacturer's container certifying fertilizer content.

E. Submit samples of proposed mulch for use in planting beds.

F. Submit complete written maintenance instruction at least ten (10) days prior to end of maintenance period. Include all requirements for proper care, development and maintenance of planting.

G. Submit contractor's Guarantee Form for Landscape Architect's review.

H. Submit seed analysis certification of seed used in sod operations.

I. Submit composts quality certification and soil amendment certification.

J. Project Data Form

1.4 PLANT AVAILABILITY

A. The name and address of the sources or suppliers of all plant materials shall be furnished to the Landscape Architect and University Project Manager.

B. All plant materials shall be inspected by the Landscape Architect at the time of delivery on the site. This inspection does not constitute final acceptance of any plant materials. All plant material will be inspected again at time of final inspection and once again at the end of the warranty period. Any plant found unacceptable at any time shall be immediately removed and replaced.

C. Any plant material that was substituted will be rejected on site and immediate replacements of the correct material will be made. If proof is submitted that specific plants or plants sizes are unobtainable, consider written substitution requests prior to bid for the nearest equivalent plant or size. All substitutions must me in writing on the authorized substitution form.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Temporary storage of new material:

1. No new plants shall remain in temporary storage over the winter or summer. Plants that are not planted immediately shall be protected as follows:

   a. Plants shall remain on the site of the work no longer than three days prior to being planted or placed in storage.

   b. The earth balls shall be kept moist and their solidity carefully preserved. To prevent drying out or freezing, store plants in a compact group with suitable mulch material placed around and between the balls so they are completely covered. The method of storage of plants and mulch material shall be acceptable to the Landscape Architect.

   c. Provide irrigation to stored plants.

B. Do not deliver or use topsoil in frozen or muddy conditions.

C. Packaged materials shall be delivered in factory labeled containers showing weight, content and manufacturer. Protect all materials from damage and deterioration during delivery and storage at site.

D. Sod: Harvest deliver, store and handle sod according to requirements in TPI's "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in its "Guideline Specifications to Turfgrass Sodding".

1.6 EXISTING UTILITIES

A. Before planting, locate all underground utilities prior to digging. Do not place plants on or near utility lines. Obtain a digging permit first (see the General Conditions) and have the permit at the site.

1.7 PLANTING SCHEDULE

A. Before bidding each bidder shall investigate sources of supply and determine availability of all plants specified on the planting list in size, variety and quantity. Failure to take this precaution will not relieve the successful bidder from responsibility as a contractor to furnish and install all plant material in strict accordance with the contract without additional expense to the Owner.

1.8 ESTABLISHMENT, MAINTENANCE, REPLACEMENT, AND GUARANTEE

A. The establishment period shall begin at the time that the planting phase of the work is completed, inspection and written notice is given and shall continue until the date of substantial completion. See Total Site Maintenance Section 3.13.

B. This Contractor shall be responsible to maintain all planted materials in a health and growing conditions for a period of any four consecutive growing months (growing months are defined as April, May, June, July, August and September) after the date of substantial completion. The continuing maintenance service shall occur during the warranty period.

C. Maintenance shall include but not be limited to watering, weeding, pruning, spraying, adjusting of guys, and lawn maintenance as described herein.

D. Guarantee a close knit stand of grass by watering, mowing, re-grading and re-sodding eroded areas and otherwise maintaining lawn area to the satisfaction of the University Project Manager and Landscape Architect, until final acceptance. Any areas, which fail to show a thick, vigorous, healthy grass stand, shall be reseeded at Contractor's expense with the same seed or sod originally specified. Re-sod or reseed as required during the establishment, maintenance, maintenance service and warranty periods until all affected areas are accepted by the Landscape Architect.

E. Guarantee all planting for one year following signature of Owner on the final contract payment application.

PART 2 – MATERIALS

2.1 TOPSOIL

A. Topsoil for planting operations shall be imported onto the project site. It shall be friable, fertile, natural sandy loam containing at least 4% organic matter. PH range shall be 5.5 to 8.2 inclusive, shall be capable of sustaining vigorous plant growth. It shall be free of admixture of subsoil and shall be reasonable free of stones, lumps, clods of hard earth, plants or their roots sticks, or other extraneous matter. It shall not be used for planting operations in a frozen or muddy condition. Topsoil shall not contain more than 2% rock.

B. Prior to delivery of topsoil to the site the Contractor shall furnish commercial soil tests for Landscape Architect's approval. If such tests indicate the topsoil to be other than the type specified it shall be replaced with topsoil which shall conform to the specifications at no additional compensation to the Contractor.

C. If the submitted topsoil fails to contain a 4% humus, the topsoil shall be amended as follows:

   Add compost at a rate of 6 cy per every 18 cy of topsoil and 19 lbs. of sulfur per 1000 s.f. of topsoil area and mechanically blend on site with a Dakota or approved equal mechanical blender.

D. Topsoil shall be tested after amend are added to verify 4% organic matter. Add additional compost and retest at contractors expense until the 4% rate is met. The amended topsoil shall be approved by the Architect prior to planting operations.

E. Topsoil shall not be used for planting operations while in a frozen or muddy condition.

2.2 PEAT MOSS

A. Peat moss used in shrub and tree backfill mix: High quality pure Canadian sphagnum peat with a pH value not less than 3.5 nor greater than 6.0 at 25°C. The ash content shall be not more than 10% and water holding capacity shall be not less than 800%.

B. All peat shall comply with Q-P-166e, Class B coarseness.

2.3 ORGANIC SOIL AMENDMENTS (COMPOST)

A. Compost: Well composted, stable and weed free organic matter, pH range of 5.5 to 8' moisture content 35 to 55 by weight; 100 percent passing through a ¼" sieve; soluble content of 5 to 10 decisiemens/m; not exceeding .5% inert contaminants and free of substances toxic to planting.

B. Compost to meet USU extension Compost Quality Guidelines for Landscaping.

2.4 INORGANIC SOIL AMENDMENTS

A. Sulfur: Granular, biodegradable, containing a minimum of 90% sulfur, with a minimum of 99% passing through No. 6 (3.35-mm) sieve and a maximum of 10% passing through No. 40 (.425-mm) sieve.

2.5 BACKFILL

A. Backfill soil mixture shall be the following materials well mixed in the specified proportions, which are by volume.

Product	Proportion
Peat moss or organic soil conditioner	1 part
Topsoil	4 parts

2.6 COMMERCIAL FERTILIZER – LAWNS

A. Fertilizer for lawns shall be commercial fertilizer O-F-C 241C type 1 Level B, uniform in composition, dry and free flowing. It shall contain the following percentage by weight: 16% of nitrogen, 16% of phosphoric acid, 8% of potash. Fertilizer shall be delivered mixed as specified in standard-sized bags, showing weight, analysis of content, and name of manufacturer as required by state regulations. If soil tests recommend variance from these percentages obtain Landscape Architect's approval prior to applications. Animal fertilizer is not used on Campus.

2.7 COMMERCIAL FERTILIZER – TREES AND SHRUBS

A. Fertilizer for trees, shrubs and ground cover planting areas shall be slow release type, Osmocote 18-6-12 used according to manufacturer's printed instructions. Animal fertilizer is not used on Campus.

2.8 MISCELLANEOUS PRODUCTS

A. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with [ASTM D 448 for Size No. 8].

B. Composite wood/plastic edging: Composite edging product shall be manufactured by the Trex Company or approved equal.

C. Planter Filter Fabric: Woven or nonwoven geotextile manufactured for separation applications and made of polypropylene fibers.

1. DeWitt Pro 5 Weed Barrier.

2.9 LAWN MATERIALS

A. Turfgrass Sod: **Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects**, complying with TPI's "Specifications for Turfgrass Sod Materials" in its "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

A. Fescue Turf: Blend of Fescue grasses shall be of good texture, free from noxious roots, stones and foreign materials. The Sod shall be nursery grown and shall be well rooted eighteen (18) month old growth of permanent and desirable grasses, suitable for growth in the general location of the project.

1. Sod shall be “DuraTurf” Fescue from the Turf Company or approved equal

2.10 PLANT MATERIAL

A. All plants shall have been grown under climatic condition similar to those in the locality of the project for at least two (2) years and shall have been transplanted or root pruned at least once in the last two (2) years.

B. All plants shall be number one quantity specimens and shall have a uniform matching caliper, size and canopy, be symmetrical with standard height, spread and branching patterns. No park grade plant material is acceptable.

C. Plants shall be marked for identification.

D. All plants shall be symmetrical and shall conform to the size, age and condition as specified on the plant list shown on the Drawings. Exceptions are as follows:

E. Dig balled and burlapped (BB) plants with firm, natural balls of earth, of diameter not less than specified and of sufficient depth to include all fibrous and feeding roots. No plant moved with a ball will be accepted if the ball is cracked or broken before or during planting operations, except on special approval of the Architect.

F. Roots or balls or all plants shall be adequately protected at all times from sun and/or drying winds.

G. Plants marked “cans”, “pots” or “other container” on the plant list shall have been grown in the containers for a minimum of six (6) months and a maximum of two (2) years. Roots shall fill the containers but show no evidence of being or having been root bound. Plants shall not be picked up or moved by stem or branches, but shall be lifted and handled from the sides of the containers.

2.11 GUYING AND STAKING MATERIAL

A. Tree stakes: steel “T” post, 8’long.

B. Hose: High quality braided rubber or plastic hose, ¾” diameter and suitable length (Color Black).

C. Wire: 12 gauge galvanized steel.

2.12 STONE MULCH

A. Stone mulch shall be a clean washed crushed stone, ¾ to 1" in size. Color to match 'woodland blend' (at the USTAR project) or similar as approved by the University Project Manager.

2.13 WEED BARRIER FABRIC

A. Fabric shall be UV resistant, woven spunbond needle punch, polypropylene, wt. 5 oz, per square yard, color black. Use Typar or Dewitt Pro 5 Weed Barrier.

2.14 WATER

A. Potable water

2.15 HERBICIDE

A. Contact Herbicide; Round-up or approved equal.

2.16 MECHANICAL BLENDER

A. The mechanical Blender shall be a Dakota 2250 model or approved equal.

PART 3 – EXECUTION

3.1 COORDINATION

A. The Contractor shall coordinate his work with other contractors on site, and shall cooperate to the fullest extent to see that the work is completed in a timely and workmanship like manner.

3.2 MECHANICAL BLENDING OF TOPSOIL

A. All topsoil submitted which does not contain a minimum of 4% humus shall be mechanically blended on the project site with compost and sulfur.

B. Blend every 18 cy of topsoil with 6 cy of approved compost and 18 lbs. of sulfur.

C. The mechanical blender shall use a Conveyor Belt Feed Measured by Adjustable Gates.

3.3 INSTALLATION OF TOPSOIL

A. Spread the amended topsoil to a minimum depth of 18" in planting beds and ground cover areas allowing for 3" of bark mulch.

B. Spread the amended topsoil to a minimum depth of 6" in all lawn areas. Do not place topsoil over subgrade that is frozen or damp. Place topsoil just prior to seeding so as to discourage weed growth.

C. Surface drainage shall be insured, and if shown, shall be directed in the manner indicated on the Drawings by molding the surface to facilitate the run-off water. Fill low spots and pockets with topsoil and grade to drain properly.

D. The finish grade of the topsoil adjacent to all sidewalks, mow strips, etc., and prior to planting, shall be at the same grade as the adjacent paving. No exceptions.

E. The Landscape Architect shall approve the finish grading prior to application of seed, sod or plant material. Make minor adjustments to finish grades at the direction of the Landscape Architect.

3.4 PREPARATION OF LAWN AREAS

A. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus ½" (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

B. The surface on which lawn is to be installed shall be firm and free of footprints, depressions or undulations of any kind. The surface shall be free of all rocks larger than ½" in diameter and all sticks, roots, rubbish, and other extraneous materials. If a crust has formed on the topsoil, it shall be loosened by raking prior to seeding.

C. On all areas, use a fertilizer combination of 16-16-8 commercial fertilizer applied at the rate of four (4) pounds per 1000 sq. ft. and work into the top 2" of soil at least two (2) days before sowing grass sees

3.5 SODDING

A. Provide one (1) application of commercial fertilizer 16-16-8 at the rate of 3 lbs. per 1,000 sq. ft. just prior to the laying of the sod. Notify the University Grounds Department 24 hours prior to intended fertilizer application. University Grounds may inspect the site and fertilizer prior to application, and witness the application procedure.

B. Sod may be placed at any time when the ground is not frozen. Sod shall be cut and laid on site within a 48 hour period following harvest.

C. The joints shall be closely laid and filled with a mixture of grass seed and screened topsoil at the rate of two (2) pounds of seed to each cubic yard of topsoil. It shall be thoroughly tamped to a true and even surface at the required finished grade.

D. Slopes greater than 1:3 should be staked down by driving a wooden peg through the sod. Always lay sod across slope. Wire stakes shall not be used for pegging sod.

E. The grass sod shall be mowed before it exceeds two (2") in height. The grass will be cut to not less than 1¼" and during the establishment and maintenance period the lawn shall not exceed two (2") in height. Lawn clippings that remain on the lawn surface longer than four (4) days shall be removed and disposed of properly.

F. Protection of the newly laid sod shall be the complete responsibility of the Contractor. .

G. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1½" (38 mm) below sod.

H. After the sod is established, apply one application of broadleaf weed control and one application of fertilizer.

3.6 PREPARATION FOR PLANTING TREES AND SHRUBS

A. Locate the exact placement of all trees and shrubs and secure approval of the University Project Manager and Landscape Architect prior to the digging of any holes. Refer to the Drawings for the sizes and preparation of holes. Prepare all holes according to the details on the Drawings.

B. Prior to the installing of any plant material in the prepared hole, the Project Manger must approve the size, width and depth of the hole.

3.7 TREE AND SHRUB PLANTING

A. Prior to planting, fill excavated planting hole with water and allow to percolate out. If, after 24 hours, the water has not percolated out of the pit, notify the Landscape Architect. Do not plant until the problem has been corrected.

B. The tree plant hole should be the same depth as the root ball, and three times the diameter of the root ball. See Handout “B”, Steps for Planting a Tree.

C. The tree hole depth shall be determined so that the tree may be set slightly high of finish grade, 1” to 2” above the base of the trunk flare, using the top of the root ball as a guide.

D. Set the tree on the soil and remove ALL burlap, wire baskets, wrapping, twine or rope from the sides of the root ball prior to commencing backfill operations.

E. All plants shall be thoroughly watered immediately following planting. .

F. The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches. All cuts, scars and bruises shall be properly treated according to the direction of the Landscape Architect. Proper pruning techniques shall be used. Do NOT leave stubs and do NOT cut the leader branch. Improper pruning shall be cause for rejection of the plant material.

G. A 3” deep saucer shall be formed at the edge of plant pit. Water the same day as planted.

3.8 PLANTING GROUND COVERS

A. Dig holes large enough to allow for spreading of roots and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover crowns of plants with wet soils.

3.9 MULCH INSTALLATION

All planting beds shall receive a 4” stone mulch layer

3.10 TREE STAKING AND GUYING

A. Staking of trees shall be done immediately after they are planted. Plants shall stand plumb after staking. All stakes shall be removed by this Contractor after the guarantee period has concluded.

B. Trees 2½" caliper or less shall be supported by two steel "T" stakes placed diametrically opposite at perimeter line of ball and to sufficient depth to hold tree rigid. .

3.11 WATER SCHEDULE

A. Due to water conservation / water restrictions, watering of the landscape shall be accomplished after 6:00 pm and before 10:00 am.

3.12 CLEAN UP AND PROTECTION

A. During landscape work store materials and equipment where directed. Keep pavement clean and work area in an orderly condition.

3.13 TOTAL SITE MAINTENANCE

A. As part of this Contract, this Contractor shall be responsible for the continuous maintenance of all landscape areas, i.e., weeding, watering, mowing, fertilization, etc. from the time that each section of lawn or each area of landscape planting commences until the Project Date of Substantial Completion. **All Landscape planting in this section shall be maintained until end of growing season. I**f any lawn area or area of landscape planting is deemed not to be substantially complete by the Project Date of Substantial Completion or the above date, whichever is later, all required maintenance shall be provided by this Contractor after the Project Substantial Completion date, until said area is substantially complete. If landscape or turf areas are not deemed substantially complete by the Owner and Architect by the date of substantial completion, the Owner may at his discretion, require the following remedies at no additional cost, in addition to the standard maintenance required for sodded or seeded areas:

1. Sodding of seeded areas.
2. Additional fertilization operations
3. Additional mowing operations
4. Additional specific watering operations
5. Weed control measures
6. Aerating operations

B. Maintain plants in a vigorous, thriving condition by watering, cultivating, weeding, pruning, spraying and other necessary operations. No trees or shrubs will be accepted unless they are healthy and show satisfactory foliage conditions. Plants shall be maintained through the length of the total site maintenance period.

C. The Contractor shall instruct the Owner as to the watering requirements and shall monitor such operations at all times. The Contractor shall be held responsible for failure to monitor the watering requirements and shall be held responsible to replace any or all plants that are lost due to improper application of water.

D. Lawns shall be maintained for as much time as necessary to establish over the entire lawn a close stand of grass of the varieties specified, free of weeds and undesirable coarse, native grasses, but in no case less than four (4) growing months or two (2) mowings after substantial completion of landscape and irrigation work.

E. All lawns shall be fertilized every three (3) weeks with six (6) 2 pounds of 16-16-8 commercial fertilizer per 1000 sq. ft. until the end of the maintenance period required. It shall be the responsibility of this Contractor to notify the Landscape Architect and Owner in writing 48 hours prior to fertilizing to provide visual verification of work.

3.14 MAINTENANCE SERVICE

A. Maintenance Service for ALL Plant Materials: Provide maintenance by skilled employees of landscape Installer. Maintain as required in 1.12 and 3.13. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

   1. Maintenance Period: Four growing months from the date of Substantial Completion which will be April, May, June and July of 2016.

3.15 FINAL INSPECTION AND ACCEPTANCE

A. Inspection will be made of the entire site periodically and at the conclusion of the maintenance period, the required maintenance service and the warranty period.

B. Where inspected landscape work does not comply with the requirement, replace rejected work and continue specified maintenance until re-inspected by the Landscape Architect and found to be acceptable. Remove rejected plants and materials promptly from the project site. Replace rejected material within a two week time frame.

C. All work done under this contract shall be left in good order to the satisfaction of the Owner and the Landscape Architect and the Contractor shall without additional expense, replace any trees, or other plant material which develop defects or dies within one year from the date of substantial completion.

   1. A written guarantee that covers the above provisions shall be signed by the Contractor and delivered to the Landscape Architect upon acceptance of the work.

   2. The guarantee shall not be binding upon the Contractor if any failure should be proved to the satisfaction of the Landscape Architect to result from circumstances or negligence of parties over whom the Contractor has no control.

3.16 RECORD DRAWINGS

A. Record Drawings shall be furnished to the Landscape Architect at the time of the substantial completion inspection before a letter documenting Substantial Completion for the landscape planting will be issued. This information shall be provided in AutoCAD format and shall be given to the Landscape Architect before the project is accepted. The AutoCAD file shall be a copy of the original plans for the project and shall be corrected by the contractor at the Contractor's expense.

HANDOUT "B"

University of Utah Grounds Department

STEPS FOR PLANTING A TREE

Developed by the International Society of Arboriculture (ISA)

1. **Dig a shallow, broad planting hole.**
   Make the hole wide, as much as three times the diameter of the root ball, but only as deep as the root ball.

2. **Identify the trunk flare.**
   The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (see diagram). If the trunk flare is not partially visible, remove some soil from the top of the root ball. Find the trunk flare to determine how deep the hole needs to be for proper planting.

3. **Place the tree at the proper height.**
   Before placing the tree in the hole, check to see that the hole has been dug to the proper depth, and not more. It is better to plant the tree a little high, 1" to 2" above the base of the trunk flare, than to plant it at or below the original growing level. This will allow for some settling (see diagram). Always lift the tree by the root ball, and never by the trunk to avoid damage when setting the tree in the hole.

4. **Straighten the tree in the hole.**
   Before backfilling, ask an assistant to view the tree from several directions to confirm the tree is straight.

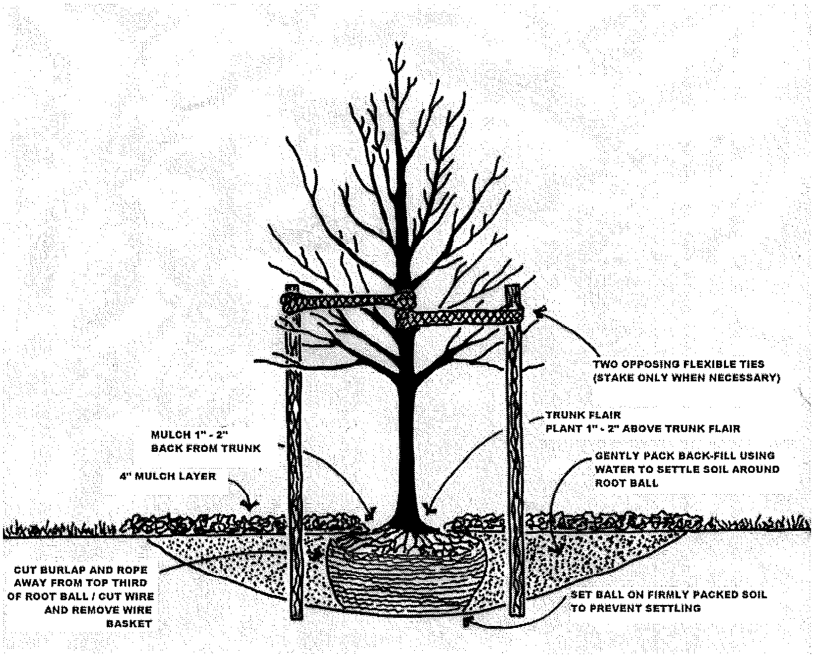
5. **Fill the hole gently but firmly.**
   Fill the hole about 1/3 full and gently but firmly pack the soil around the base of the root ball. Then, if the tree is balled and burlapped (or contained in a wire basket), cut and remove the rope, string, wire, and or wire basket from around the trunk and top 1/3 of the root ball (see diagram). Use care not to damage the trunk or roots in the process.

   Fill the remainder of the hole, firmly packing the soil to eliminate air pockets that may cause roots to dry out. To avoid this problem, add the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. Do not apply fertilizer at time of planting unless approved by the Grounds Department.

6. **Stake the tree, if necessary.**
   Except in rare cases **trees should not be staked.** However, protective staking may be required on sites where lawn mower damage, vandalism, or windy conditions are concerns. If staking is necessary for support, two stakes used in conjunction with a wide flexible tie material will hold the tree upright, provide flexibility, and minimize injury to the trunk (see diagram).

7. **Mulch the base of the tree.**
   Apply a four inch layer. Do not cover the actual trunk of the tree. A mulch free area, one to two inches wide at the base of the tree is sufficient to avoid moist bark conditions and prevent decay.

8. **Follow-up care.**
   Keep the soil moist, but not soaked.



END OF SECTION – 329301

SECTION 330500 - COMMON WORK RESULTS FOR UTILITIES

1.1 SUMMARY

A. This Section includes the following:
   1. Identification devices.
   2. Grout.
   3. Piped utility demolition.
   4. Piping system common requirements.

1.2 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

C. ABS: Acrylonitrile-butadiene-styrene plastic.

D. CPVC: Chlorinated polyvinyl chloride plastic.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

1.3 PIPING JOINING MATERIALS

A. Solvent Cements for Joining Plastic Piping:

   1. ABS Piping: ASTM D 2235.
   2. CPVC Piping: ASTM F 493.
   3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
   4. PVC to ABS Piping Transition: ASTM D 3138.

1.4 IDENTIFICATION DEVICES

A. General: Products specified are for applications referenced in other Division 33 Sections. If more than single type is specified for listed applications, selection is Installer's option.

1.5 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

   1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

1.6 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 330500

SECTION 333100 - SANITARY SEWERAGE PIPING

1.1 SUMMARY

A. This Section includes gravity-flow, nonpressure sanitary sewerage outside the building, with the following components:

1. Special fittings for expansion and deflection.
2. Cleanouts.
3. Drains.
4. Precast concrete manholes.
5. Cast in place manhole bases over existing pipes.
6. Sewerage Pipes.

1.2 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Sewer-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least water tight under specified head, unless otherwise indicated.

1.3 PVC PIPE AND FITTINGS

A. PVC Pressure Pipe: AWWA C900, Class 150 for gasketed joints and using ASTM F 477, elastomeric seals.

1. Fittings NPS 4 to NPS 8: PVC pressure fittings complying with AWWA C907, for gasketed joints and using ASTM F 477, elastomeric seals.
2. Fittings NPS 10 and Larger: Ductile-iron, compact fittings complying with AWWA C153, for push-on joints and using AWWA C111, rubber gaskets.

B. PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 80 pipe, with plain ends for solvent-cemented joints with ASTM D 2467, Schedule 80, socket-type fittings.

C. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

D. PVC Sewer Pipe and Fittings, NPS 18 and Larger: ASTM F 679, T 2 wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

E. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

1.4 NONPRESSURE-TYPE PIPE COUPLINGS

A. Use non-pressure type couplings only when pipes can not be connected together with standard fittings and typical pipe connections such as bell and spigot. If possible, file the end on existing pipes to create spigot type connections to match existing pipe ends for connection to a new bell for an extension of the pipe.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.
2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Manufacturers:

a. Dallas Specialty & Mfg. Co.
b. Fernco Inc.
c. Logan Clay Products Company (The).
d. Mission Rubber Company; a division of MCP Industries, Inc.
e. NDS Inc.
f. Plastic Oddities, Inc.

D. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Manufacturers:

a. Cascade Waterworks Mfg.
b. Dallas Specialty & Mfg. Co.
c. Mission Rubber Company; a division of MCP Industries, Inc.

E. Ring-Type Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

1. Manufacturers:

a. Fernco Inc.
b. Logan Clay Products Company (The).
c. Mission Rubber Company; a division of MCP Industries, Inc.

1.5 SPECIAL PIPE FITTINGS

A. Ductile-Iron Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include 2 gasketed ball-joint sections and 1 or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated.

B. Ductile-Iron Deflection Fittings: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include rating for 250-psig minimum working pressure and for up to 15 degrees of deflection.

C. Ductile-Iron Expansion Joints: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Include rating for 250-psig minimum working pressure and for expansion indicated.

1.6 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1.7 MANHOLES

A. Standard Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.

1.8 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 4000 psi minimum, with 0.58 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

END OF SECTION

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Channel drainage systems.
3. Manholes.
4. Cleanouts.
5. Nonpressure transition couplings.
6. Expansion joints.
7. Catch basins.
8. Stormwater inlets.
9. Pipe outlets.
10. Storm water retention system.

B. Design storm system to prevent off-site discharge of the first 1 inch of rainfall from a 24 hour storm preceded by 48 hours of no measurable precipitation.

1.2 RELATED DOCUMENTS

A. DFCM Design Manual, University of Utah Supplement, September 21, 2012

1.3 CONCRETE PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.

1. Bell-and-spigot or tongue-and-groove ends and gasketed joints with ASTM C 443 rubber gaskets
2. Class III
3. Class V

1.4 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443 rubber.
2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
3. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

1.5 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478 precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 60 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990 bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923 cast or fitted into manhole walls, for each pipe connection.
9. Steps: Deformed, 1/2-inch reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
10. Retain one of two subparagraphs below if required to raise top of manhole to grade.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

1.6 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

2. Benches: Concrete, sloped to drain into channel.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.

1.7 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

1. Description: ASTM C 478 precast, reinforced concrete, of depth indicated, with provision for sealant joints.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: 24 by 36 inches minimum unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent unless otherwise indicated.
3. All shall be Bicycle Safe type grates.

1.8 STORMWATER INLETS

A. Curb Inlets: Made with vertical curb opening.

B. Gutter Inlets: Made with horizontal gutter opening. Include heavy-duty frames and grates.

C. Combination Inlets: Made with vertical curb and horizontal gutter openings. Include heavy-duty frames and grates.

D. Frames and Grates: Heavy duty.

1.9 PIPE OUTLETS

A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.

B. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."

1. Average Size: NSSGA No. R-3, screen opening 2 inches.
2. Average Size: NSSGA No. R-4, screen opening 3 inches.
3. Average Size: NSSGA No. R-5, screen opening 5 inches.
4. Retain both paragraphs below to require specific stone sizes.

C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.

1.10 UNDERGROUND STORMWATER RETENTION SYSTEM

A. Loading: H-20 traffic rated

B. Material: Reinforced concrete, corrugated metal, polypropylene, or high density polyethylene.

C. Layout: Pipe layout shall provide for unobstructed continuous internal space so as to not impede flow of water.

D. Impermeable barrier: Non-reinforced 30 mil PVC thermoplastic liner.

END OF SECTION 334100

SECTION 334600 - SUBDRAINAGE

1.1 RELATED DOCUMENTS

A. DFCM Design Manual, University of Utah Supplement, September 21, 2012

1.2 SUMMARY

A. This Section includes subdrainage systems for the following:

1. Foundations.

1.3 DEFINITIONS

A. HDPE: High-density polyethylene plastic.

B. PE: Polyethylene plastic.

C. PP: Polypropylene plastic.

D. PS: Polystyrene plastic.

E. PVC: Polyvinyl chloride plastic.

F. Subdrainage: Drainage system that collects and removes subsurface or seepage water.

1.4 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings:

1. NPS 6 and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
2. NPS 8 and Larger: ASTM F 667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
3. Couplings: Manufacturer's standard, band type.

1.5 SOLID-WALL PIPES AND FITTINGS

A. PE Drainage Tubing and Fittings: AASHTO M 252, Type S, corrugated, with smooth waterway, for coupled joints.

1. Couplings: AASHTO M 252, corrugated, band type, matching tubing and fittings.

B. PE Pipe and Fittings: AASHTO M 294, Type S, corrugated, with smooth waterway, for coupled joints.

1. Couplings: AASHTO M 294, corrugated, band type, matching tubing and fittings.

1.6 CLEANOUTS

A. PVC Cleanouts: ASTM D 3034, PVC cleanout threaded plug and threaded pipe hub.

1.7 SOIL MATERIALS

A. Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 31 Section "Earth Moving."

1.8 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.

1. Structure Type: Nonwoven, needle-punched continuous filament
2. Style(s): Flat and sock

1.9 PIPING APPLICATIONS

A. Underground Subdrainage Piping:

1. Perforated PE pipe and fittings, couplings, and coupled joints.
2. Perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.

1.10 CLEANOUT APPLICATIONS

A. In Underground Subdrainage Piping:

1. At Grade in Earth: PVC cleanouts.
2. At Grade in Paved Areas: Cast-iron cleanouts.

END OF SECTION 334600