

Southcentral Foundation

DESIGN AND CONSTRUCTION STANDARDS

Version 1.0 (Working Draft)

Note to Readers:

Thank you for partnering with SCF on our design and construction projects. Effective 02/11/25, Version 1.0 (Working Draft) shall be used as a reference by all SCF Design Consultants. It is incumbent upon all SCF Consultants to communicate any discrepancies or conflicts with applicable project codes or regulations immediately to the assigned SCF Construction Project Managers or the Director of Facility Planning. Unauthorized access or use of the SCF Design and Construction Standards is prohibited. Document revisions will be tracked and executed by SCF at least annually. SCF appreciates general feedback on these Standards. Please share input for consideration with Kristin Heusser, Construction Project Manager at kheusser@southcentralfoundation.com.

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TECHNICAL REQUIREMENTS

The technical requirement sections are organized to match the common industry arrangement used in specifications standardized by the Construction Specifications Institute (CSI).

As shown in the following below, each section begins by identifying the CSI Master Format section number followed by the corresponding Section title. Below those, the phrase “Section Includes:” identifies a short introduction to the contents of the section. Following the introduction, the primary content shall be presented following CSI Section Format. This organizes the contents into three parts designated by

1. Design Requirements
2. Products
3. Execution

The phrase “(NOT USED. FIELD RESERVED FOR FUTURE INPUT.)” shall designate a part with no specific design guidance.

Typical section arrangement:

SECTION XX XX XX – TITLE

Section Includes: Short explanation describing the intent of the section.

1. Design Requirements
 - a. This section identifies certain components, restrictions, sensitivities, or other information important to the reader.
 - b. Sub-section design requirements described as needed.
2. Products
 - a. Specific product requirements, mandatory products, and product suggestions are identified here alongside product limitations or products expressly prohibited.
 - b. If no products are described, then the selection of products shall be at the designer of records discretion.
3. Execution
 - a. This section is used to describe specific elements of the implementation of the design requirements where a preference exists for some methodologies or methodologies expressly prohibited.

DIVISION 03 – CONCRETE

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

Section Includes: Interior and exterior concrete, formwork, reinforcing, finishing, and curing.

1. Design Requirements
 - a. Reference the relevant American Concrete Institute (ACI) standards in all concrete specifications.
 - b. The contract documents should require the submission of shop drawings for reinforcing bars, formwork, and shoring, etc. The civil or structural engineer of record should review the shop drawings.
 - c. Require samples of special or exposed finishes for approval by the architect and owner.
 - d. Design all concrete with proper expansion, contraction, and construction joints.
 - e. Provide recommendations for placement of concrete in cold weather or hot weather as necessary.
 - f. The contract documents should require all necessary special inspections to comply with applicable building codes.
2. Products
 - a. Buildings, foundations, and similar structures
 - i. All concrete must have a minimum compressive strength of 3,000 psi with a mix-design that meets all applicable ACI durability requirements.
 - b. Exterior slabs-on-ground and other exterior flatwork
 - i. Concrete exposed to freezing temperatures and/or subject to equipment loading (i.e. snow removal) should have a minimum compressive strength of 4,000 psi and air entrainment appropriate for the aggregate size used.
 - ii. The concrete mix design must meet all applicable ACI durability requirements for its intended use.
 - c. Exposed concrete floors
 - i. Concrete floors for warehouse spaces and mechanical spaces shall be a clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 - d. Sustainability

- i. The use of Portland Limestone Cement (Type 1L) is preferred when:
 - I. Locally available and applicable for the intended use.

3. Execution

- a. Include acceptable means of concrete repair with project construction documents.
- b. Finishing slabs
 - i. Provide for a water cure after the slab is finished. A curing compound may be used if approved by SCF or the design team. Provide hardeners and sealers as needed and appropriate for the intended use.
 - ii. Coordinate polished concrete finishing with the manufacturer of the slab sealant.
 - iii. Specify if the contractor is responsible for providing adequate environmental conditions for curing all slabs.
- c. Minimum tolerances
 - i. Use the standard ACI tolerances for placement of concrete & reinforcing where applicable.
 - ii. Humidity testing shall be conducted before installation of any floor finishes. Quantitative testing is preferred, and qualitative testing shall be considered on a case-by-case basis.

DIVISION 04 – MASONRY

SECTION 04 01 10 – MASONRY CLEANING, REPAIRING AND RESEALING

Section Includes: Non-historic applications for unit masonry and stone surfaces.

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Specify mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.

SECTION 04 20 00 – UNIT MASONRY

Section Includes: Brick, structural clay facing tile, and stone trim units.

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed installation.

SECTION 04 22 00 – CONCRETE UNIT MASONRY

Section Includes: Concrete Masonry Unit (CMU), reinforcing, and accessories.

1. Design Requirements
 - a. Use expansion or control joints as necessary to accommodate size changes from temperature differentials.
 - b. The contract documents should require the submission of shop drawings for reinforcing bars, formwork, and shoring, etc. The civil or structural engineer of record should review the shop drawings.
 - c. The contract documents should require all necessary special inspections to comply with applicable building codes.
 - i. If the project occurs in an area with no applicable building code, special inspections should still be completed as required to comply with the International Building Code (IBC) adopted by the State of Alaska.
2. Products
 - a. Material strength

- i. Use CMU with a minimum compressive design strength (F_m) of 1,500 psi.
 - b. Sustainability
 - i. The use of locally sourced CMU blocks is preferred when available.
- 3. Execution
 - a. Include an acceptable means of concrete repair with project construction documents.
 - b. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed installation.

SECTION 04 26 13 – MASONRY VENEER

Section Includes: Masonry Veneer over wood or metal stud backup.

- 1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution
 - a. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed installation.
 - b. Installation is not to begin until all substrates have been properly prepared before stone installation, including necessary flashings, transitions, flatwork and penetrations in stone areas.
 - c. Establish lines, levels, and coursing. Protect from disturbance.
 - d. Commencement of work by installer is acceptance of substrate.
 - e. Installation is not to occur where overhead work is taking place at any time.

SECTION 04 42 00 – EXTERIOR STONE CLADDING

Section Includes: stone cladding, adhered tile veneer, and accessories.

- 1. Design Requirements
 - a. Design wall assemblies to receive adhered stone cladding or stone tile veneer to ensure a maximum deflection limit of $L/600$.
 - b. Specify mockups of tile work by General Contractor. Mockups shall be reviewed for acceptable installation quality standard by the Architect and by SCF.
 - c. Tile Veneer Unit Properties:
 - i. Manufactured stone veneer units and accent pieces consisting of Portland cement, lightweight aggregates, and mineral oxide pigments.

- ii. Compressive Strength: ASTM C 192, not less than 1800 psi.
- iii. Sheer Bond, Type S Mortar and Backing: ASTM C 482, min 50 psi.
- iv. Freeze-Thaw: ASTM C 67, less than 3% weight loss.
- v. Fire Hazard Test: UL Standards met, 0/0 Flame spread.
- vi. Maximum Veneer Unit Weight: 15 lbs/square foot (ft²).

d. Warranty

- i. Provide 15-year total system warranty for exterior adhered tile veneer systems including adhesives, mortars, grouts, fluid applied waterproofing, and finish materials:
 - I. From the date of Substantial Completion, and
 - II. Stating that the manufacturer shall repair or replace system components that show evidence of defects, deterioration, or failure.

2. Products

- a. Adhered tile veneer shall be set using polymer modified, thin-set mortar.
- b. Exterior adhered tile veneer systems shall use a waterproofing membrane approved by the mortar manufacturer.
- c. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution

- a. Natural stone shall be sealed before and after grouting to prevent staining.
- b. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed installation.
- c. Installation is not to begin until all substrates have been properly prepared before stone installation, including necessary flashings, transitions, flatwork and penetrations in stone areas.
- d. Establish lines, levels, and coursing. Protect from disturbance.
- e. Commencement of work by installer is acceptance of substrate.
- f. Installation is not to occur where overhead work is taking place at any time.

DIVISION 05 – METALS

SECTION 05 12 00 – STRUCTURAL STEEL

Section Includes: Interior and exterior structural steel and accessories.

1. Design Requirements

- a. The design of the structural steel system should consider the potential for corrosion and a means of reducing the severity or consequences of corrosion.
- b. Where necessary, the structural steel system should be detailed to limit dust collection.
- c. Structural steel members, connections, and components that are exposed to the public view should be classified as Architecturally Exposed Structural Steel (AESS) in the contract documents and fabricated in accordance with the AISC Code of Standard Practice, with the version adopted by the building code.
- d. Consider vibrations due to human activity and equipment for new and retrofit designs. Provide structural floors, stairs, frames, and other steel systems with acceptable vibration performance for the intended use. For performance requirement reference:
 - i. AISC Design Guide 11: Vibrations of Steel-Framed Structural Systems Due to Human Activity for performance requirements.
- e. The contract documents should require all necessary special inspections to comply with the applicable building code.

2. Products

- a. Use steel shapes specified in the latest edition of the AISC Steel Construction Manual and generally available in the Continental US.
- b. Sustainability
 - i. Use steel with a minimum of 90% recycled content where feasible or required.

3. Execution

- a. Perform metal finishes and protective coatings touch up before covering during construction.
- b. Coordinate with other work to ensure that all metal surfaces have the appropriate protective coatings to resist corrosion.

SECTION 05 31 00 – STEEL DECKING

Section Includes: Interior and exterior steel decking for roofs and floors and accessories.

1. Design Requirements

- a. The design should consider protection from corrosion of metal decks used in an exterior or corrosive environment.
 - i. For steel decking used as a parking deck, follow the recommendations of AISC Design Guide 18: Steel Framed Open-Deck Parking Structures
 - ii. Composite metal decks used in exterior or corrosive environments should only be used as stay-in-place forms and not relied upon for long term strength.
- b. Design documents should clearly state where any temporary construction shoring of metal deck is required and delineate who is responsible for providing the design.
- c. The contract documents should require all necessary special inspections to comply with the applicable building code.

2. Products

- a. Provide a hot-dip galvanized finish or an equivalent protective coating on all metal decking.
- b. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 05 40 00 – COLD FORMED METAL FRAMING

Section Includes: Interior and cold exterior formed metal framing and accessories.

1. Design Requirements

- a. Metal framing used in walls or ceilings must be sufficiently stiff to prevent damage to brittle finishes such as tile or masonry. Consider limiting deflections $L/360$ for members supporting brittle finishes.
- b. Use metal stud to stud bracing where practical.
- c. Coordinate all blocking required for wall mounted equipment.
- d. The contract documents should require all necessary special inspections to comply with the applicable building code.

2. Products

- a. Use standard American Iron and Steel Institute (AISI) shapes where possible.
- b. Use cold formed steel members with a minimum size and thickness of:

- i. Exterior non-load bearing walls:
 - I. 1 $\frac{5}{8}$ -inch flange and 33 mills (20 gauge)
 - ii. Load bearing walls:
 - I. 1 $\frac{5}{8}$ -inch flange and 43 mills (18 gauge)
 - iii. Floor and Ceiling Joists:
 - I. 1 $\frac{5}{8}$ -inch flange and 54 mills (16 gauge)
 - c. Provide a hot-dip galvanized finish, or approved equivalent, on all cold formed framing members.
 - d. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 05 50 00 – METAL FABRICATIONS

Section Includes: Metal ladders, railings, stairs, stair nosings, miscellaneous framing and supports.

1. Design Requirements
 - a. Metal ladders, permanent and fixed
 - i. Required at roof access hatches, unless specifically authorized otherwise by SCF.
 - ii. Are required between different roof elevations not provided with separate means of roof access.
 - iii. Shall include a ladder safety extension post above the roof opening.
 - iv. Shall include 2" wide (minimum) slip-resistant ladder rungs.
 - v. Alternating tread devices and ship ladders are not permitted for new construction.
 - b. Metal railings
 - i. Shall be designed to support the required loads with deflection not more than L/360, or 1/8 inch, whichever is less.
 - ii. Specify backing plates within stud walls as required to support design loads.
 - iii. Specify inserts cast into concrete where possible for concrete construction; avoid use of surface mounted brackets.
 - iv. Shall be galvanized or stainless steel at exterior and wet locations.
 - v. Brackets, flanges, and anchors shall be of the same metal and finish as supported rails.
 - c. Metal stairs

- i. Shall be designed to support a minimum uniform load of 100 lbs./sf and concentrated load of 300 lb/ft. with deflection not more than L/360, or 1/4 inch, whichever is less.
 - ii. Supporting steel plates, shapes, and bars to meet ASTM A36/A36M
 - iii. Interior metal stairs shall be shop primed and finished after assembly.
 - iv. Fabricate stairs according to National Association of Architectural Metal Manufacturers (NAAMM) Architectural Metal Productions (AMP) 510 "Metal Stairs Manual" unless directed otherwise.
 - d. Metal stair nosings
 - i. Application: High traffic stairs and exterior stairs.
 - ii. The leading edge shall be a contrasting color to rest of stair tread.
 - iii. Self-adhered vinyl grip tape is not permitted.
 - e. Miscellaneous framing and supports
 - i. Provide steel framing and supports not specified in other sections as needed to complete the work.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 05 70 00 – DECORATIVE METAL

Section Includes: Decorative formed metal, decorative metal stairs, decorative metal railings, glazed decorative metal railings, and column covers.

- 1. Design Requirements
 - a. Decorative formed metal
 - i. Includes beam wraps, closures and trim, filler panels, lighting coves, metal base, pockets for window treatment.
 - ii. For decorative metal items, source each color, grade, finish, type, and variety of metal from single source with resources to provide products of consistent quality in appearance and physical properties.
 - iii. Conceal fasteners where possible; otherwise, locate where they are as inconspicuous as possible.
 - b. Decorative metal stairs
 - i. For components exposed to view in the completed work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
 - ii. See related Section 05 50 00 – Metal Fabrications for additional information.

- c. Decorative metal railings
 - i. Application: Guards, handrails, and similar devices for protection of occupants at open-sided floor and exterior deck areas with high aesthetic/visual impact.
 - ii. Brackets, flanges, and anchors shall be of the same metal and finish as supported rails.
 - d. Glazed decorative metal railings
 - i. Application: Areas with high aesthetic/visual impact when determined to be project appropriate.
 - ii. Specify safety glazing from single source/manufacturer.
 - iii. Exterior safety glazing shall be windborne-debris-impact-resistant laminated glass guards: ASTM C1172, Type II with two plies of glass bonded together with an interlayer.
 - e. Column covers
 - i. Subject to inclusion within a project on a case-by-case basis.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
 3. Execution
 - a. Fabricate decorative metals to fit tightly to adjoining construction.

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

SECTION 06 10 00 – ROUGH CARPENTRY

Section Includes: Interior and exterior structural wood, manufactured wood products, and accessories.

1. Design Requirements

- a. Wood framing used in walls or ceilings must be sufficiently stiff to prevent damage to brittle finishes such as tile or masonry. Consider limiting deflections $L/360$ for members supporting brittle finishes.
- b. The design of wood members and fasteners should provide adequate protection for corrosion and decay, including:
 - i. Provide requirements for all preservative treatments to limit degradation of wood elements, including coating of all field cuts where preservative treatment is necessary.
 - ii. Use naturally rot resistant wood species, such as Cedar, in lieu of treated wood where use, performance, and cost are feasible.
 - iii. Provide adequate corrosion resistance for fasteners used in wood with preservative treatment.
- c. Specify the necessary fire protection of wood members and connections.
- d. The contract documents should require all necessary special inspections to comply with the applicable building code.
- e. Limitations on the use of wood products:
 - i. Particleboard substrates are not permitted
 - ii. The use of Oriented Strand Board (OSB) is not permitted. At a minimum, use APA rated plywood sheathing with an exposure-1 rating for exterior or underfloor use.
 - iii. Carefully consider the effects of transportation and weather protection for all wood products, including engineered wood products, particularly for rural locations.

2. Products

- a. Sustainability
 - i. The use of Forestry Stewardship Council (FSC) certified wood is to be considered where economically feasible.

3. Execution

- a. Coordinate all blocking required for wall mounted equipment.
- b. At electrical and communications rooms:

- i. Provide a Fire-Retardant Pressure Treated (FRT) plywood finish for mounting equipment, with minimum 3/4-inch thickness. Coordinate the extents of plywood finishes with SCF.
- c. Temporary Protection: Provide a temporary wall system and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain during construction.
 - i. Refer to SCF Clean Construction Procedures.
 - ii. Provide protection to ensure safe passage of people around selective demolition/construction areas and to and from occupied portions of existing building(s).
 - iii. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - iv. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - v. Cover and protect furniture, furnishings, and equipment that have not been removed.

SECTION 06 20 00 – FINISH CARPENTRY

Section Includes: Exposed wood (nonstructural), engineered wood siding, engineered wood soffits, wood door frames, casings, moldings, and trims.

- 1. Design Requirements
 - a. Use of northern and western wood species is preferred.
 - b. Specify wood-preserved-treated materials for exposed wood.
- 2. Products
 - a. Particleboard substrates are not permitted.
 - b. Sustainability
 - i. Use of Forestry Stewardship council (FSC) certified wood is preferred.
- 3. Execution
 - a. Prime lumber and moldings are to be painted, including both faces and edges, unless factory primed.

SECTION 06 40 00 – ARCHITECTURAL WOODWORK

Section Includes: Architectural wall surfacing, trim, door frames, shutters, casework and ornamental items.

1. Design Requirements

- a. Wood Finish: Synthetic varnish system. Formulation shall meet all SEFA 8 requirements.
- b. All architectural woodwork shall be shop finished.
- c. Wood Casework Fabrication:
 - i. Edge banding to be hardwood, minimum 3mm thick.
 - ii. Plywood substrates for construction of countertops, millwork panels and casework are required.
 - iii. Use cabinet door silencers, typical.
 - iv. Cabinet doors perpendicular to adjacent wall to receive hinges that open to 85 degrees.
 - v. Particleboard substrates are not permitted.

2. Products

- a. Use full extension, heavy duty, self-closing drawer slides—Accuride or equal.
- b. Sustainability
 - i. Use of Forestry Stewardship council (FSC) certified wood is preferred.

3. Execution

- a. Fabricate and install in accord with AWI, Premium Grade standards.
- b. Adequate in-wall FRT blocking to be provided to securely anchor scheduled cabinetry and fixtures. Provide proper coordination with other trades to ensure the element's precise location.
- c. All joints and mitered connections shall be constructed tightly, with all fasteners and adhesives entirely concealed.
- d. Casework fasteners to be countersunk and/or blind nailed as required for complete installation.
- e. Casework to be set plumb, level, and scribed/sealed tightly to adjacent surfaces. Use concealed shims and fasteners where required.
- f. All paint grade installations shall receive caulk as required, before field applied finished paint.

SECTION 06 41 16 – PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS AND COUNTERTOPS

Section Includes: Custom-made plastic-laminate cabinets, casework, and countertops.

1. Design Requirements

- a. All casework should consider the following:

- i. Durability: Finishes resistant to scratching, delamination, surface cracking/factures, punctures and tears.
 - ii. Maintenance: SCF preferred chemical cleaning solution compatible with finished surface
 - iii. Quality: High quality finishes with required minimum flame-spread index finishes and substrates, composed of environmentally friendly materials, and aid in the efficient function of space.
 - b. Plywood for the construction of countertops, panels and casework are required. Particleboard substrates are not permitted.
 - c. Eased edge or rounded edges are preferred.
 - d. Horizontal work surfaces to be 1½-inch-thick, high-pressure laminate with matching polyvinyl chloride (PVC) edge band. Grommets that match countertop, are to be coordinated in field.
 - e. Standard casework construction:
 - i. Walls: ¾-inch-thick plywood
 - ii. Lower backs: ¼-inch-thick hardboard melamine
 - iii. Upper backs: ½-inch-thick plywood melamine
 - iv. Shelves <32-inch span: ¾-inch-thick
 - v. Shelves >32-inch span: ¾-inch-thick
 - vi. Drawers: ½-inch-thick birch sides, ¼-inch-thick hardboard bottom, routed into drawer sides, sanded smooth
 - vii. Backsplash: to match countertop thickness/material
 - viii. Door and Drawer Fronts: ¾-inch Birch or Maple banded door with hardwood veneer or GREENGUARD-certified high-pressure laminate laminated to 100% pre-consumer recycled wood fiber cores.
 - ix. All casework with enclosed shelving shall be adjustable.
 - x. Cabinet doors perpendicular to adjacent wall to receive hinges that open to 85 degrees.
 - xi. Use cabinet door silencers, typical
 - xii. Stainless steel cabinet pulls with a minimum of 4-inch center-to-center mount

2. Products

a. Sustainability

- i. Provide GREENGUARD-certified high-pressure laminate laminated to 100% pre-consumer recycled wood fiber cores.

3. Execution

- a. AWI standards are the minimum quality criteria for all custom casework construction.
- b. Adequate in-wall FRT blocking to be provided to securely anchor scheduled cabinetry, equipment, and fixtures. Provide proper coordination with other trades to ensure the element's precise location.
- c. Any penetrations or attachments to the counter's surface shall be prepped and sealed with clear silicone.
- d. All joints and mitered connections shall be constructed tightly, with all fasteners and adhesives entirely concealed.
- e. If required, casework fasteners to be countersunk and/or blind nailed as required for complete installation.
- f. Casework to be set level and scribed/sealed tightly to adjacent surfaces. Use concealed shims and fasteners where required.
- g. All paint grade installations shall receive caulk as required, before field applied finished paint.

SECTION 06 50 00 – SOLID SURFACING COUNTERTOPS

Section Includes: Solid surface countertops and integral sinks.

1. Design Requirements

- a. Plywood substrates for the construction of countertops required. Particleboard substrates are not permitted.
- b. Eased edge is preferred.
- c. Countertops with drop-in or undermount sink(s):
 - i. 1½-inch-thick with 4-inch-high backsplash, consistent with countertop material Unless Otherwise Noted (U.O.N.)
 - ii. Preferred counter material to be selected based on application.
 - I. Solid surface
 - II. Heat-resistant material, not limited to:
 - a) Quartz
 - b) Stainless steel
- d. Countertops with integral sink(s):
 - i. Concealed in-wall steel counter supports spaced at 4-ft-0-inch maximum.

- ii. Continuous, concealed, square steel tubing required at the counter's front edge.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. AWI standards are the minimum quality criteria for all custom casework construction.
 - b. Large counter/sink units to be carefully coordinated to ensure that the fabricated unit can be delivered to the final installation location.
 - c. Any penetrations or attachments to the counter's surface shall be prepped and sealed with clear silicone.
 - d. All joints and mitered connections shall be constructed tightly, with all fasteners and adhesives entirely concealed.
 - e. If required, countertop fasteners to be countersunk and/or blind nailed as required for complete installation.
 - f. Countertop to be set level and scribed/sealed tightly to adjacent surfaces. Use concealed shims and fasteners where required.

SECTION 06 80 00 – COMPOSITE FABRICATIONS

Section Includes: Glass Fiber Reinforced Plastic Fabrications (FRP)

1. Design Requirements
 - a. Application: Walls in food service preparation areas and janitor closets, or where specified.
 - b. Materials shall comply to ASTM-D-790M-86, ASTM-D-638M-86b, ASTM-2583-87, ASTM E-84 performance requirements.
 - c. Thickness: 0.10-inch (2.5 mm); Panel Width: 4 ft (1.22 m) Panel Height: Either 8 or 10 ft (2.5 or 3 m).
 - d. Provide welding rods, joint strips, transitions strips, and edge trims.
 - e. Exposed top edge to be finished with stainless steel strip.
 - f. Wall base to be continuous with a tight fitting, hygienic installation.
2. Products
 - a. Sustainability:
 - i. Use low volatile organic compound (VOC) polyurethane adhesive.
3. Execution
 - a. Preparation and installation of all FRP systems shall follow the product manufacturer's recommendations and instructions.

- b. Adequate in-wall FRT blocking to be provided to securely anchor scheduled cabinetry, equipment, and fixtures. Provide proper coordination with other trades to ensure the element's precise location.
- c. In wet areas, substrate shall be glass-mat gypsum board.

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 07 01 50.19 – PREPARATION FOR REROOFING

Section Includes: Full roof tear-off, partial roof tear-off, temporary roofing, roof re-cover preparation, fastener pull-out testing, and disposal.

1. Design Requirements

- a. Design removal, replacement, patch, and repair materials and surfaces cut or damaged during reroofing, by methods and with materials that do not void existing roofing system warranty.
- b. Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing and new roofing system.

2. Products

- a. When determined to be applicable, designer to specify one of the following temporary protection materials:
 - i. EPS Insulation: ASTM C578.
 - ii. Plywood: DOC PS 1, Grade CD, Exposure 1.
 - iii. OSB: DOC PS 2, Exposure 1.
- b. Refer to the following sections for new or replacement roof materials:
 - i. Section 07 31 13 – Asphalt Shingles
 - ii. Section 07 31 29 – Wood
 - iii. Section 07 40 00 – Metal Roofing and Siding
 - iv. Section 07 53 23 – Low Slope Roofing Membrane
- c. Bituminous, built-up roofing may be authorized by SCF for re-roof and renovation projects.
- d. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution

- a. Designer to specify protection of existing, adjacent roofing system that is not part of remodel in reroof scope.

SECTION 07 10 00 – DAMP PROOFING

Section Includes: Bituminous damp proofing.

1. Design Requirements

- a. Provide cold-applied, emulsified-asphalt damp proofing
- b. Specify, where required, extruded-polystyrene board insulation, unfaced, ASTM C578, Type X, R-value to achieve IECC requirements

- c. Locations:
 - i. Any concrete or masonry foundation walls that retain earth and enclose interior spaces below grade shall be damp proofed – or waterproofed at high water table sites – from the top of the footing to six inches above the finished grade.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution
 - a. Specify no less than two brush or spray coats for all foundations or no less than a basis-of-design manufacturer’s installation recommendations.
 - b. Damp proofing installations require inspection by the A/E or special inspector before cover or backfill.

SECTION 07 21 00 – THERMAL INSULATION

Section Includes: General building insulation installed at project site, excluding roof insulation.

- 1. Design Requirements
 - a. Fiberglass batt insulation is not permitted at removable ceilings or within roof assemblies unless in residential application.
 - b. Exterior insulation outboard of wall framing must comply with local code requirements.
 - c. Exterior heated walkways and interior floors with in-floor radiant heat must be insulated on the underside with closed-cell rigid polystyrene.
 - d. Specify appropriate surface-burning characteristics and fire-resistance ratings based on minimum project needs and applicable code requirements.
 - e. Acoustic ceiling return plenums are not allowed to have open face insulation
 - f. See Section 07 53 23 – Low Slope Roofing for roof insulation requirements.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution
 - a. Insulation to be installed behind all devices installed in an acoustic partition or ceiling appropriate for the type of construction.

SECTION 07 24 19 – EXTERIOR INSULATION AND FINISH SYSTEM (EIFS) REPAIR

Section Includes: Repair of EIFS-clad wall assemblies that are field applied over substrate.
EIFS is not permitted on new projects.

- 1. Design Requirements
 - a. Comply with ASTM E2568 to resist uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.

- b. Specify a complete system including:
 - i. Water-resistive barrier coating, compatible with the designed substrate for ASTM E2570/E2570M.
 - ii. Drainage Mat
 - iii. Molded, Expanded Rigid Cellular Polystyrene Board Insulation
 - iv. Reinforcing Mesh
 - v. Base Coat
 - vi. Water-Resistant Base Coat
 - vii. Primer
 - viii. Finish Coat
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 07 25 00 – AIR AND WEATHER BARRIERS

Section Includes: Air barriers, weather barriers.

1. Design Requirements
 - a. Performance:
 - i. Air/weather barriers shall have a maximum air permeance of 0.004 cubic feet (ft³) per minute (min) per ft² when tested in accordance with ASTM E2178 and a minimum water vapor permeance of 5 Perms when tested in accordance with ASTM E96.
 - ii. Air/weather barriers behind exterior rain screen systems shall be high strength, high vapor permeance air/weather barrier capable of withstanding long-term exposure.
2. Products
 - a. Air barriers behind rain screen systems:
 - i. Vapro Shield LLC's WrapShield
 - ii. National Shelter Products, Inc., DRYline HP
 - iii. Or pre-approved equal
 - b. Air barriers (non-rain screen systems):
 - i. Tyvek CommercialWrap
 - ii. Kingspan Greenguard Raindrop 3D
 - iii. Or pre-approved equal
3. Execution

- a. Air/weather barriers shall be installed as a continuous system and integrated with water/damp proofing, roof membrane, and flexible flashings at openings.

SECTION 07 26 00 – VAPOR RETARDERS

Section Includes: Various products used to inhibit the transfer of moisture through the perimeter of the building.

1. Design Requirements
 - a. Under slab vapor retarders shall be reinforced and have a maximum permeance of 0.01 Perms when tested in accordance with ASTM E96.
 - b. Interior vapor retarders shall have a maximum permeance of 0.045 Perms when tested in accordance with ASTM E96.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Vapor retarders at wall and roof joints shall be detailed and installed as a continuous system.
 - b. Interior vapor retarder installations require inspection by the A/E and/or special inspector before cover.

SECTION 07 31 13 – ASPHALT SHINGLES

Section Includes: Glass-fiber-reinforced asphalt shingles.

1. Design Requirements
 - a. Provide laminated-strip asphalt shingles with algae resistant granules that comply with wind resistance requirements of ASTM D3161/D3161M for Class F, and with ASTM D7158/D7158M for Class H.
 - b. Provide self-adhering, polymer-modified bitumen sheet underlayment for the entire roof area.
2. Products
 - a. Basis-of-design
 - i. Malarkey Vista AR
 - ii. Owens Corning Duration Premium
 - iii. Or other approved equal
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 07 31 29 – WOOD SHAKES

Section Includes: Wood shakes used as roof covering.

1. Design Requirements
 - a. Wood Shingles and Shakes are not approved for new projects without prior approval from SCF.
2. Products
 - a. Wolf Creek Cedar Inc.
 - b. Or other approved equal
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 07 40 00 – METAL ROOFING AND SIDING

Section Includes: Preformed metal roofing, composite metal wall panels, standing-seam roof panels, preformed metal wall panels, metal wall vents.

1. Design Requirements
 - a. Metal roofing and siding shall accommodate without deformation anticipated thermal movement over an ambient temperature range of minus 75 degrees Fahrenheit (°F) to 100°F.
 - b. Metal roofing shall withstand structural loads (dead, live, wind, snow) and shall accommodate movement caused by the following without damage to the system, components, or seals:
 - i. Normal movement
 - ii. Seasonal temperature cycling
 - iii. Deflection of the structural support framing
 - c. Specify a self-adhering, high-temperature underlayment for metal roofing that must be capable of withstanding temperatures up to 250°F (121°C) and comply with ASTM D1970 standards for self-adhered underlayment.
 - d. Metal siding and roofing shall be factory finished with finish system suitable to meet warranty requirements. Field finishing of new products is not permitted.
 - e. Batten-seam metal roof panels are not permitted on new projects.
 - f. Warranties
 - i. Metal Roof Warranty: Metal Roofing manufacturer shall provide 20-year factory-applied finish warranty and 5-year weather-tightness warranty for roof system:
 - I. From the date of Substantial Completion, and
 - II. Stating that the manufacturer shall repair or replace system components that show evidence of finish degradation and/or that fail to keep out water.

- ii. Composite Metal Panel Warranty: Composite Metal Panel manufacturer shall provide a 20-year factory-applied finish warranty and 5 year delamination warranty for panels:
 - I. From the date of Substantial Completion, and
 - II. Stating that the manufacturer shall repair or replace panel components that show evidence of finish degradation and/or observable deformation as a result of delamination of metal skin from the core material.
- g. Coordinate siding with foundation wall vents (when required on projects)
 - i. Vents shall be either aluminum extrusions meeting ASTM B221 (ASTM B221M), Alloy 6063-T5, T-52, or T6, aluminum sheet meeting ASTM B209 (ASTM B209M), alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish, or aluminum castings meeting ASTM B26/B26M, alloy 319.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 07 41 00 – INSULATED METAL ROOF AND WALL PANELS

Section Includes: Insulated metal panels for roofs and walls.

- 1. Design Requirements
 - a. Insulated metal panels shall accommodate without deformation anticipated thermal movement over an ambient temperature range of minus 75°F to 100°F.
 - b. Insulated metal roof panels shall withstand structural loads (dead, live, wind, snow) and shall accommodate movement caused by the following without damage to the system, components, or seals:
 - i. Normal movement
 - ii. Seasonal temperature cycling
 - iii. Deflection of the structural support framing
 - c. Warranty
 - i. Insulated Metal Panel Warranty: Insulated Metal Panel manufacturer shall provide 20-year factory-applied finish warranty and 10-year weather-tightness warranty for panels:
 - I. From the date of Substantial Completion, and

- II. Stating that the manufacturer shall repair or replace panel components that show evidence of finish degradation and/or failure of water tightness, loss of integrity of the seals, and/or deflection and buckling.
 - d. Insulated metal wall panels exterior sheets shall have minimum 24-gauge thickness
 - e. SCF prefers designers review and consider non-combustible insulation for project inclusion when appropriate.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 07 46 24 – WOOD SHINGLE AND SHAKE SIDING

Section Includes: Wood shingles, shakes and wood-shingle-clad panels used as exterior wall cladding (siding).

1. Design Requirements
 - a. Specify western-red cedar for wood shingles and shakes.
 - b. Avoid the use of chromated copper arsenate as a preservative when possible.
 - c. Provide vapor permeable weather barrier or ventilated underlayment over non-permeable weather barrier.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 07 46 24 – PLASTIC SIDING

Section Includes: Vinyl siding and soffit. Acceptable for rural projects only when pre-approved by SCF.

1. Design Requirements
 - a. Integrally colored product complying with ASTM D3679.
 - b. Provide minimum thickness of 0.46mm or more when budget allows.
 - c. Provide insulation backed products.
 - d. Provide accessories and soffit panels from single manufacturer.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Field painting is not allowed.

SECTION 07 46 46 – FIBER-CEMENT SIDING

Section Includes: Fiber-cement siding and soffit is **NOT** allowed for new projects unless pre-approved by SCF.

SECTION 07 52 16 – STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING

Section Includes: SBS-modified bituminous membrane roofing is **NOT** allowed for new projects unless pre-approved by SCF

SECTION 07 53 23 – LOW SLOPE ROOFING MEMBRANE

Section Includes: Ethylene-Propylene-Diene-Monomer (EPDM) Roofing; cover board, rigid roof insulation, roof sheathing.

1. Design Requirements

- a. Low-slope roofs must drain to internal roof drains; parapet scuppers are not permitted. Overflow roof drains shall be located upslope 2-inches of the primary drain. Overflow drains shall not have a water dam.
- b. Roof protection is required along routes between roof access and rooftop equipment; adhered walkway pads are preferred over roof pavers.
- c. Warranty: Roofing manufacturer shall provide 20-year total roof assembly warranty:
 - i. From the date of Substantial Completion, and
 - ii. Stating the manufacturer shall repair or replace defective materials if the roofing systems leaks or allows insulation beneath the membrane to become wet during the entire warranty period.
- d. SCF's standard low-slope roof system consists of (top to bottom):
 - i. Fully-adhered EPDM membrane roofing, 60 mils thick (minimum).
 - ii. Cover board – polyisocyanurate, mechanically fastened.
 - iii. Insulation - Expanded polystyrene, Type II
 - iv. Vapor retarder, see Section 07 26 00 – Vapor Retarders
 - v. Roof sheathing – exterior glass-mat gypsum board, Type X.
 - vi. Structural roof deck
- e. Roof assembly R-value to achieve minimum R-40 average
- f. Provide epichlorohydrin (ECH) adhered directly to EPDM around grease vents.
- g. Ballasted roof membranes and inverted roof membrane assemblies (IRMAs), including green roofs, require SCF pre-approved.

- c. Roof curbs:
 - i. Shall project a minimum of 12 inches above the highest adjacent roof surface.
- d. Roof walkway pads:
 - i. Shall be adhered, molded, slip resistant type.
 - ii. Shall be spaced appropriately to allow drainage through and around pads.
 - iii. Shall be located around all serviceable roof-mounted equipment and along routes between roof access points and equipment.
 - iv. If sufficient, may be used to protect low roofs from falling snow and ice from high roofs.
- e. Roof service platforms:
 - i. Required Locations:
 - I. Where rooftop equipment maintenance in a kneeling or prone position is required.
 - II. Where travel over rooftop utilities or seismic joints wider than 12 inches is required.
 - ii. Shall be slip resistant fiberglass or galvanized steel bar grate with non-penetrating platform supports providing four inches of clearance above roof membrane.
 - iii. Width and depth of service platform shall match the clear width and depth of the equipment service area, but not less than 18 inches.
 - iv. Shall NOT have serrated or sharp edges.
- f. Gutters and downspouts:
 - i. Shall be used at sloped roofs and canopies adjacent to pedestrian walkways, landscaping and site appurtenances (bike racks, waste receptacles, etc.).
 - ii. Shall be galvanized steel or aluminum; vinyl and PVC are not permitted.
- g. Fall protection
 - i. Verify with SCF fall protection plans for existing buildings.
 - ii. Provide fall restraint lifeline system complete with posts, wire rope and accessories.
 - iii. Anchor posts to withstand 5,000 lb minimum breaking strength, installed with minimum 12-inches of post above roofing membrane

- I. Posts to be located 10 feet from the fall edge as measured from the outside face of parapet or roof edge.
 - iv. Stainless steel wire rope to withstand 2,000 lb minimum breaking strength
 - v. Safety flags that are 4 by 5-inch PVC orange flat on 21-inch steel wire.
2. Products
- a. Snow Guards
 - i. S-5
 - ii. Alpine
 - iii. Other approved equal
 - b. Roof Hatches
 - i. Bilco
 - ii. Other approved equal
 - c. Anchor Posts
 - i. Guardian CB18
 - ii. Other approved equal
 - d. Safety Flags
 - i. Presco
 - ii. ACE Supply
 - iii. Other approved equal
 - e. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
- a. Provide one safety flag at each post.
 - b. Secure wire post to anchor with two stainless steel draw bands above flashing boot. Secure on side opposite roof edge.

SECTION 07 80 00 – FIRE AND SMOKE PROTECTION

Section Includes: Firestopping and fire safing.

1. Design Requirements
- a. Fire-resistive assemblies and concealed firestopping/fire safing shall be permanently identified above accessible ceilings with the following information:
 - i. Fire-resistive rating of the assembly, clearly labeled.

- ii. Approval agency and listing number for firestopping and fire safing installations used at penetrations through fire-resistive assemblies.
 - b. Firestopping that is exposed in occupiable spaces shall be concealed by escutcheons.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 07 92 00 – JOINT SEALANTS

Section Includes: Elastomeric joint sealants including, silicone, urethane, silyl terminated polyether (STPE), polysulfide, butyl, and latex, and preformed joint seals.

1. Design Requirements
 - a. Joint sealants shall be installed only at air and substrate temperatures above 40°F.
 - b. Exterior joint sealants shall accommodate joint movements resulting from temperatures ranging from minus 35 to 100°F.
 - c. Preformed joint seals shall be manufactured from urethane or EVA (ethylene vinyl acetate) foam with a minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent.
 - d. Designers are responsible for selecting appropriate sealants for fire-rated penetrations and joints.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Architect or special inspector required to inspect all fire-rated penetrations during construction.

SECTION 07 95 13 – EXPANSION JOINT COVER ASSEMBLIES

Section Includes: Expansion joint cover assemblies for exterior building walls, soffits, and parapets.

1. Design Requirements
 - a. All expansion joint cover assemblies shall meet the required seismic and fire-resistance ratings.
 - b. Interior exposed metal floor joint covers shall be aluminum.
 - c. Parking deck joint cover units shall be longest practicable lengths available to minimize field splicing.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 08 – OPENINGS

SECTION 08 11 00 – METAL DOORS AND FRAMES

Section Includes: Metal doors and frames.

1. Design Requirements

- a. Exterior doors and frames shall be insulated and thermally broken to include door glazing channels.
- b. Minimum double pane ($U=.25\text{Btu/hr-ft-F}$ center of glass maximum) safety glass for exterior door glazing.
- c. Knock-down interior door frames are not permitted without prior approval from SCF.
- d. 42-inch-wide swing doors are preferred.
 - i. Exception: Medical applications should comply with Facility Guidelines Institute (FGI) guidelines
- e. Unless otherwise specified, exam rooms to have Sliding/track mount doors.
 - i. Where space is limited, exam rooms that cannot have sliders should have a privacy swing.
 - ii. Airborne infection isolation and protective environment rooms are encouraged to have sliding doors as they are proven to significantly reduce contamination.
 - iii. Provide Sound Transmission Class (STC) rating for sliding doors required to meet room type standards.
 - iv. Wood doors for sliding and track mounted conditions are preferred.
- f. Openings to loud mechanical equipment rooms to have increased sound attenuation assemblies.
- g. Coordinate door numbers and room names with SCF.

2. Products

- a. Hollow metal frames for doors and glazing pockets
 - i. For commercial and residential use.
 - ii. Doors/glazing:
 - I. Exterior Doors: 16-gauge faces, with polystyrene core, minimum R value of 14
 - II. Exterior Frames: 14-gauge thick material, with integral thermal break
 - III. Interior Doors: 16-gauge thick cold-rolled sheet steel faces
 - IV. Interior Frames: 14-gauge thick material, once piece, welded.

- iii. Finish: Exterior Units: hot dipped galvanized with factory applied oil based primer and high performance enameled finish coat in the field.
 - iv. Exterior doors where SCF intends to use salt for ice removal purposes, install a stainless-steel mop plate to the exterior face.
 - b. All residential entry doors require security view ports.
 - c. Aluminum Frames
 - i. Interior frames for wood or aluminum doors and glazing in gypsum-board partitions.
 - ii. Door Frames: Extruded aluminum, reinforced for hinges, strikes, and closers.
 - iii. Glazing Frames: Extruded aluminum
 - d. Sliding-Door Head Tracks: Extruded aluminum where exposed; provide complete with door-hanging assemblies and floor guides (no plastic).
 - e. Finish Color: Clear anodized aluminum is the preferred common color for storefronts. Alternate colors that complement the building finish or existing doors may be allowed. Coordinated with SFC.
 - f. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution
 - a. Do not paint or cover up labels of independent testing agencies or equipment name, identification, performance rating, nomenclature plates, or fire ratings.

SECTION 08 14 00 – WOOD DOORS

Section Includes: Wood doors, wood-veneer, plastic-laminate-faced flush wood doors, and composite doors.

- 1. Design Requirements
 - a. Wood doors shall not be used for exterior doors.
 - b. Flush wood door cores shall be lumber, Agri fiber-plastic, or structural composite lumber formaldehyde-free products only.
 - i. Interior use only. No exterior wood doors allowed.
 - ii. No wood doors allowed on fire doors more than 45 minutes.
 - c. Hollow-core doors are not permitted.
 - d. Natural wood veneer doors shall be custom with Grade A faces, minimum.
 - e. High pressure decorative laminate (HPDL) veneer or galvanized steel, electrostatically painted doors shall be used at locations requiring frequent cleaning or disinfection.

- f. Coordinate door numbers and room names with SCF.

2. Products

a. Interior Wood Doors

- i. Transparent finish solid core doors:
 - I. Birch or hard maple, plain sliced faces, semi-gloss polyurethane finish. Paired doors shall be book matched.
 - II. Minimum 5-ply veneer faces.

b. Interior Wood Sliding Doors

- i. Aluminum or Steel frame preferred.
- ii. Transparent finish solid core doors:
 - I. Birch or hard maple, plain sliced faces, semi-gloss polyurethane finish. Book match to room or corridor.

c. Minimum 5-ply veneer faces.

- i. Provide STC rating for sliding doors required to meet room type standards.
- ii. Provide wood frames or painted metal frames on glazed door lights. For retrofits, match adjacent doors to the extent possible.
- iii. Provide metal door frames under 08 11 00.
- iv. All residential entry doors require security view ports.
- v. Require wood blocking on all stiles and rails and any location where hardware will be attached, for non-rated doors.

d. Sustainability

- i. Use of Forestry Stewardship council (FSC) certified wood is preferred

3. Execution

SECTION 08 31 00 – ACCESS DOORS AND PANELS

Section Includes: access doors and panels.

1. Design Requirements

a. Access Doors:

- i. Typical Locations:
 - I. Wall access doors.
 - II. Fire-rated access doors
 - III. Ceiling access doors.
 - IV. Fire-rated ceiling access doors

- V. Trap primers, valves, cleanouts
 - VI. Dry pendant fire sprinklers
 - VII. Utilidor exterior access
 - ii. Access doors and panels for valve access by hands and arms only must be a minimum of 12 x 12 inches; 16 x 16 inches is preferred.
 - iii. Access doors and panels for entry of maintenance personnel must be a minimum of 24 x 30 inches; 36 x 36 inches is preferred.
 - iv. Access to shut-offs must be labeled "EMERGENCY X SHUT-OFF."
 - v. Exterior utilidor access: 3 feet x 3 feet minimum, 4 feet x 4 feet preferred.
 - vi. Interior utilidor access: Full size door per section 08 11 00.
 - vii. At secured or restricted access locations, or locations concealed from public view, access shall be possible by hand-actuated quarter turn tee-handle; removal of multiple screws is not acceptable.
 - viii. For locations exposed to public view, doors shall have keyed cylinder locking device.
 - ix. All such access doors shall be keyed alike.
 - x. Access doors and panels in wet locations, including restrooms and janitor's closets, shall be stainless steel.
 - xi. Plastic access doors or panels are not permitted.
 - xii. Doors to be located for best access to equipment or space above. In walls, center door on valve being accessed to the extent possible.
 - xiii. Swing doors into pressurized shafts.
2. Products
- a. Hinged: Stainless steel or aluminum at wet locations. Plain steel, factory primed and field finished in non-wet locations. Do not paint locking hardware.
 - b. Sustainability (FIELD RESERVED FOR FUTURE INPUT)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 08 33 00 – OVERHEAD COILING DOORS, OVERHEAD COILING COUNTER DOORS, SECTIONAL DOORS

Section Includes: Overhead coiling doors, overhead coiling counter doors, overhead sectional doors.

- 1. Design Requirements
 - a. Overhead coiling doors over 8 feet wide shall be power operated.

- b. Overhead sectional doors and power operated coiling doors shall be power operated with bumper sensing door bottom.
- c. Exterior doors shall be fully insulated and sealed.
- d. Doors shall withstand the effects of earthquake motions as required by Seismic Design Category and Importance Factor.

2. Products

a. Coiling Doors:

- i. Open-Curtain Grille will have a network of horizontal rods that interconnect with vertical links.
- ii. Closed-Curtain Grille will have a curtain with a series of horizontal ribs alternating with continuous horizontal infill panels secured by ribs.
- iii. Provide Aluminum, Stainless steel, or Galvanized steel.
- iv. Bottom bar, curtain jamb guides, and exposed hood to match curtain material and finish.
- v. Locking Devices: Equip grille with locking device assembly.
- vi. Manual Grille Operator: Manufacturer's standard crank operator.
- vii. Electric Grille Operator: Coordinate usage classification with SCF.

b. Sectional Doors:

- i. Provide sectional door formed with hinged sections and fabricated so that finished door assembly is rigid and aligned with tight hairline joints.
- ii. Operation Cycles: Coordinate operation cycles with SCF.
- iii. Air Infiltration: Maximum rate of 0.4 cfm/ft² when tested in accordance with ASTM E283 or DASMA 105.
- iv. U-Value minimum: 0.052 Btu/ft² x h x °F.
- v. Thermal-Break Construction: Provide sections with continuous thermal-break construction separating the exterior and interior faces of door.
- vi. Exterior Face: Fabricated from single sheets, not more than 24 inches high with horizontal meeting edges rolled to continuous horizontal connection. Steel sheet thickness minimum 0.064-inch.
- vii. Interior Face: Steel or Vinyl.

c. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 08 35 13 – FOLDING DOORS

Section Includes: Panel folding doors, Mirrored folding doors.

1. Design Requirements

- a. Top supported, horizontal-sliding panel folding doors preferred. Ceiling hung panel folding doors are not preferred.
- b. Maximize writeable surfaces on panels; contrasting edge trim to enclose writeable surface to minimize accidental trailing.
- c. Fabric panels must be washable material.
- d. Meet STC ratings required by building program.
- e. Provide recessed pockets for all panels and doors. Pockets will be aligned with adjacent wall surface. Panels will fully recess into pocket with outside face of panel aligned with adjacent wall surface.

2. Products

- a. Panel doors to be minimum 4 inches nominal width.
- b. Surface-Burning Characteristics: Comply with ASTM E84.
- c. Vinyl Facing: Factory bonded to core.
- d. Vinyl Facing with Woven Backing: Factory bonded to core.
- e. Plastic-Laminate Facing: Grade VGS, high-pressure plastic laminate complying with ISO 4586-3; adhesive applied under pressure to core.
- f. Wood-Veneer Facing: Birch or hard maple, plain sliced faces, manufacturer's standard clear transparent finish. Book match. Laminated to core.
- g. Tracks: Recessed mounted.
- h. Ceiling Guard: Metal guard to match other exposed metal.
- i. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 08 40 00 – ENTRANCES, STOREFRONTS AND CURTAIN WALLS

Section Includes: Glazed curtain wall assemblies, glazed storefront assemblies, glazed entrance doors, automatic entrance doors.

1. Design Requirements

- a. Glazed curtain wall and storefront assemblies including metal frames, glazing, and accessories.
 - i. Exterior glazed curtain wall and storefront frames shall be thermally broken at glazing channels and/or mid-point between exterior and interior surfaces.

- ii. Exterior curtain wall and storefront doors shall be thermally broken and accommodate 1-inch insulated glazing.
 - iii. Specify doors with heavy duty butt hinges. Recess hinges into the frame of the door and the jamb in accordance with manufacturer's recommendations. Provide reinforced corners and thickened hinge and lock blocks.
- b. Finish Color: Clear anodized aluminum is the preferred common color for storefronts. Alternate colors that complement the building finished or existing doors may be allowed. Coordinated with SFC.
 - i. Decorative film is required on all full height, interior glazed panels to prevent bodily injury and damage.
 - ii. Supply raceways inside the mullions or door for wiring. Provide door operators and security as requested by SCF.
 - iii. Overall System U-value including glazing: 0.25 Btu/hr-ft²-F), maximum.
 - iv. Overall System Air Leakage: 0.06 ft³/min/ft² of wall area, maximum, measured in accordance with ASTM E283.
 - v. Warranty: Manufacturer's standard 10-year warranty against overall material defects.
 - I. Limited lifetime warranty on door corners.
 - II. Extended warranty on finishes.
 - III. Manufacturer to have a local warranty/service contractor.

2. Products

- a. Aluminum Storefronts:
 - i. Acceptable manufacturers:
 - I. Kawneer.
 - II. Old Castle.
 - III. EFCO Corporation.
 - IV. Or pre-approved equal.
 - ii. Assemblies shall have the following minimum performance characteristics:
 - I. Condensation Resistance Factor of Glass and Framing: 72, minimum, measured in accordance with AAMA 1503.
 - II. Air Leakage: 0.06 ft³/min/ft² of wall area, maximum, measured in accordance with ASTM E283.

- III. No uncontrolled water on indoor face when tested in accordance with ASTM E331, pressure differential of 10 lbf/ft².
 - IV. Overall U-value including glazing: 0.25 Btu/hr-ft²-F), maximum.
- b. All-Glass Entrances and Storefronts
- i. Acceptable manufacturers:
 - I. GGI; General Glass International.
 - II. PRL Glass Systems Inc.
 - ii. Assemblies shall have the following minimum performance characteristics:
 - I. Overall insulating unit thickness: 1-1/4 inch
 - II. Condensation Resistance Factor of Glass and Framing: 72, minimum, measured in accordance with AAMA 1503.
 - III. Door Air Leakage: 1.0 ft³/min/ft² of wall area, maximum, measured in accordance with ASTM E283.
 - IV. No uncontrolled water on indoor face when tested in accordance with ASTM E331, pressure differential of 10 lbf/ft².
 - V. Solar heat gain coefficient (SHGC): 0.69, light to solar gain (LSG): 1.06
 - iii. Manual Swinging, All-Glass Entrance Doors: Patch fittings at head and sill on pivot side, and center-housing lock at swing side.
 - I. Avoid sill locks.
 - iv. Provide overhead door stop.
 - v. Provide concealed overhead door holder
 - vi. Exterior application of All-Glass Entrances and Storefronts not preferred.
- c. Automatic sliding entrance door assemblies:
- i. Acceptable manufacturers:
 - I. Stanley Access Technologies.
 - II. Assa Abloy Entrance Systems.
 - III. Dorma Group.
 - IV. Or pre-approved equal.
 - ii. Assemblies shall have the following minimum performance characteristics:
 - I. Condensation Resistance Factor of Glass and Framing: 68, minimum, measured in accordance with AAMA 1503.

- II. Door Air Leakage: 1.0 ft³/min/ft², maximum, measured in accordance with ASTM E283.
 - III. No uncontrolled water on indoor face when tested in accordance with ASTM E331, pressure differential of 10 lbf/ft².
 - IV. Door system U-value including glazing: 0.63 Btu/hr-ft²-F), maximum.
- iii. Shall be emergency break-away type, unless specifically approved otherwise by SCF.
 - iv. Breakaway Device for Power-Operated Doors: Not More than 50 lbf required for a breakaway door or panel to open.
 - v. Entrapment-Prevention Force: Not more than 30 lbf required to prevent stopped door from closing.
 - vi. Operating Temperature Range: Automatic entrances operate within minus 30 to plus 122°F.
- d. Swinging Automatic Entrances
- i. Acceptable Manufacturers:
 - I. Stanley Access Technologies.
 - II. Assa Abloy Entrance Systems.
 - III. Dorma Group.
 - IV. Or pre-approved equal.
 - ii. Assemblies shall have the following minimum performance characteristics:
 - I. Condensation Resistance Factor of Glass and Framing: 68, minimum, measured in accordance with AAMA 1503.
 - II. Door Air Leakage: 1.0 ft³/min/ft² of wall area, maximum, measured in accordance with ASTM E283.
 - III. No uncontrolled water on indoor face when tested in accordance with ASTM E331, pressure differential of 10 lbf/ft².
 - IV. Door system U-value including glazing: 0.63 Btu/hr-ft²-F), maximum.
 - iii. Shall be emergency break-away type, unless specifically approved otherwise by SCF.
 - iv. Breakaway Device for Power-Operated Doors: Not More than 50 lbf required for a breakaway door or panel to open.
 - v. Entrapment-Prevention Force: Not more than 30 lbf required to prevent stopped door from closing.

- vi. Operating Temperature Range: Automatic entrances operate within minus 30 to plus 122°F
- e. Glazed Aluminum Curtain Walls (08 44 13)
 - i. Acceptable Manufacturers:
 - I. Kawneer.
 - II. Old Castle.
 - III. EFCO Corporation.
 - IV. Or pre-approved equal.
 - ii. Assemblies shall have the following minimum performance characteristics:
 - I. Condensation Resistance Factor of Glass and Framing: 78, minimum, measured in accordance with AAMA 1503.
 - II. Air Leakage: 0.06 ft³/min/ft² of wall area, maximum, measured in accordance with ASTM E283.
 - III. No uncontrolled water on indoor face when tested in accordance with ASTM E331, pressure differential of 10 lbf/ft².
 - IV. Overall U-value including glazing: 0.25 Btu/hr-ft²-F), maximum.
- f. Structured-Polycarbonate-Panel Assemblies
 - i. Acceptable Manufacturers:
 - I. Kingspan Light + Air.
 - II. Wasco Part of Velus Commercial; Velus America.
 - III. Energy-Glazed Systems.
 - IV. Or pre-approved equal.
 - ii. Assemblies shall have the following minimum performance characteristics:
 - I. Air Leakage: 1.57 PSF, maximum, measured in accordance with ASTM E283.
 - II. No uncontrolled water on indoor face when tested in accordance with ASTM E331, pressure differential of 6.24 lbf/ft².
 - III. Overall U-value including glazing: 0.17 Btu/hr-ft²-F), maximum.
- g. Fiberglass-Sandwich-Panel Assemblies
 - i. Acceptable Manufacturers:
 - I. Kalwall Corporation.

- II. Kingspan Light + Air.
 - III. Major Industries.
 - IV. Or pre-approved equal.
- ii. Assemblies shall have the following minimum performance characteristics:
 - I. Air Leakage: 0.30 ft³/min/ft² of wall area, maximum, measured in accordance with ASTM E283.
 - II. No uncontrolled water on indoor face when tested in accordance with ASTM E331, pressure differential of 6.24 lbf/ft².
 - III. Overall U-value including glazing: 0.17 Btu/hr-ft²-F), maximum.
 - h. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
- a. There shall be no mechanical attachments or penetrations to window mullions at building's shell, interior or exterior, without authorization from the Architect.

SECTION 08 50 00 – WINDOWS

Section Includes: Aluminum windows, vinyl windows, fiberglass windows, security windows.

Related Requirements: 08 80 00 - Glazing

- 1. Design Requirements
 - a. SCF prefers designers to incorporate as much natural lighting as possible for every project.
 - b. Operable windows shall be avoided; seek authorization from SCF before including operable windows and/or passive ventilation in design.
 - i. Where used, operable windows shall have 4 inch opening limitation stops.
 - ii. Where used, provide the following operating type: Casement: Outswing.
 - iii. Where used, provide gear-type rotary operators: complying with AAMA 901 when tested in accordance with ASTM E405, Method A. Provide operators that function without requirement the removal of interior screens or using screen wickets.
 - iv. Exception: Residential bedrooms shall have operable windows as required by code for exiting on the first floor.
 - c. Exterior window frames shall be thermally broken.

- i. Fixed Windows: Overall U-value including glazing: $0.26 \text{ Btu/ft}^2 \times h \times ^\circ\text{F}$, maximum. Unless otherwise indicated in this section.
 - ii. Operable Windows: Overall U-value including glazing: $0.32 \text{ Btu/ft}^2 \times h \times ^\circ\text{F}$, maximum. Unless otherwise indicated in this section.
 - iii. Exterior frames shall accommodate 1-inch insulated glazing units, minimum.
 - d. Assemblies shall have the following minimum performance characteristics:
 - i. Condensation Resistance Factor of Glass and Framing: 72, minimum, measured in accordance with AAMA 1503.
 - ii. Air Leakage:
 - I. Fixed Windows: $0.10 \text{ ft}^3/\text{min}/\text{ft}^2$ of wall area, maximum, measured in accordance with ASTM E283.
 - II. Operable Windows: $0.30 \text{ ft}^3/\text{min}/\text{ft}^2$ of wall area, maximum, measured in accordance with ASTM E283.
 - e. Coordinate all exposed exterior aluminum components and trim to ensure uniform and consistent color and appearance.
 - f. Provide gypsum board returns at interior face of frame.
 - g. Decorative film is required on all full height, interior glazed panels to prevent bodily injury and damage.
 - h. Security Windows: Vision security windows and fixed transaction security windows. The intent is that these windows are interior.
 - i. Glazing: Polycarbonate security glazing. Two polycarbonate sheets bonded with clear urethane interlayer that complies with ASTM C1349.
 - ii. Forced-Entry Resistance: 15-minute protection level in accordance with SD-STD-01.10 or equal.
 - iii. Fixed Transaction Security Windows:
 - I. Transaction Counter: Stainless steel, 12 inches deep by width of security window, with integral deal tray.
 - II. Provide voice-communication to allow passage of speech at normal speaking volume without distortion.
 - i. Warranty: Manufacturer's standard 10-year warranty against overall material defects.
 - i. Glazing Units: 10 years
 - ii. Hardware: 5 years
 - iii. Extended warranty on finishes with a minimum of 20 years.

- iv. Manufacturer to have a local warranty/service contractor.

2. Products

- a. Aluminum Windows acceptable manufacturers:
 - i. Arcadia.
 - ii. Kawneer.
 - iii. EFCO Corporation.
 - iv. Or pre-approved equal.
- b. Vinyl Windows acceptable manufacturers:
 - i. Milgard Manufacturing.
 - ii. VPI Quality Windows.
 - iii. Or pre-approved equal.
- c. Fiberglass Windows acceptable manufacturers:
 - i. Milgard Manufacturing.
 - ii. Pella Corporation
 - iii. Alpen High-Performance Products.
 - iv. Or pre-approved equal.
- d. Security Windows acceptable manufacturers:
 - i. Armortex.
 - ii. Creative Industries, inc.
 - iii. Norshield Security Products.
- e. Or pre-approved equal.
 - i. Sustainability (FIELD RESERVED FOR FUTURE INPUT. FIELD RESERVED FOR FUTURE INPUT)

3. Execution

- a. Installer: Entity that employs installers and supervisors or authorized representative who is trained and approved by the manufacturer.

SECTION 08 71 00 – DOOR HARDWARE

Section Includes: Door hardware. Related Requirements: Section 28 13 00 – Access Control

1. Design Requirements

- a. Provide door operators and security as requested by SCF.
 - i. For new construction all exterior door entrances to be controlled via access control, see Section 28 13 00 – Access Control for additional information.

- ii. Access Control hardware must interconnect to fire detection and both visual and audible alarm systems.
 - iii. Provide door lockdown buttons as needed per coordination with SCF for security.
 - iv. Provide electronic strike door elements on exterior doors per coordination with SCF for security.
 - v. For renovations, consult with SCF on operators and security.
- b. Exterior main entry doors and heavy-use doors shall have continuous hinges.
- c. Center mullions at interior and exterior double doors, where used, shall be key-removable.
- d. Cylinders shall be Small Format Interchangeable Core cylinders (SFIC).
 - i. Provide 7-pin keyway for all cylinders unless directed otherwise by SCF.
- e. Mortise Locks and latch sets shall conform to ASI/BHMA A156.13, Series 1000, minimum Grade 1.
- f. Standard Classroom lock function shall be single cylinder non-deadbolt, with inside thumb turn and automatic unlocking (example: Schlage L9056, 06 lever with L-face trim).
- g. Standard finish: satin stainless steel.
- h. Thresholds shall be mill finish extruded aluminum, saddle type, and must comply with ADA and ANSI 117.1-2009.
- i. Door swing:
 - i. Doors shall swing open 95 degrees minimum.
 - ii. Doors with overhead stops shall swing open 100 degrees minimum.
- j. Acoustical doors shall have automatic door bottom seals and gasketing.
- k. ADA automatic pushbutton actuators are required at all public restroom doors.
- l. Power Supplies for electric locks shall include battery back-up. Consider common power supplies for multiple doors when possible.
- m. Door stops required. Wall stops preferred. Provide solid backing in walls.
 - i. In areas that are protected from high traffic and do not pose a tripping hazard, floor stops are acceptable over wall stops.
- n. Reinforced door stops required where heavier doors are installed (i.e., Audiology).

- o. Provide kick/armor plates on doors into bathrooms, rooms with equipment and bed transfers, and high-traffic areas. Areas where large pieces of equipment and carts are being pushed through should receive an armor plate to the height of a typical equipment/cart.
- p. All doors that are subject to being caught by wind must be equipped with either an overhead door stop or a door closer. This measure is to ensure the safety and functionality of the doors, preventing potential damage and injury caused by sudden wind gusts. The selected overhead door stop or door closer should be robust enough to withstand the specific wind conditions of the location and must comply with relevant safety, building, and accessibility standards.

2. Products

- a. Keying: All keys and lock cores are Best SFIC. Basis-of-design is BEST CORMAX
- b. Mechanical Locksets: All locksets, except for combination locksets, within a given building by the same manufacturer. Locksets shall be Best Lock, Brand Name Only. Cylindrical Lever locksets with backset of 2 ¾ inch. Coordinate with Maintenance and select appropriate locksets for the particular building.
 - i. Provide mortise locksets with integral color coded vacant/occupied operated by a thumb turn for rooms such as single-use restrooms and lactation rooms.
- c. Butt hinges: McKinney, Stanley, Ives
- d. Door closers: LCN (Basis of Design) or Stanley; No alternate brand; No substitutions. Specify spring cushion arm where applicable (e.g. door swinging into a wall)
- e. Exit devices:
 - i. Rim exit device: Von Duprin (Basis of Design) or Precision
 - ii. Mortise exit device: Von Duprin (Basis of Design) or Precision
 - iii. Surface vertical rod exit device: Von Duprin (Basis of Design) or Precision, specify less bottom rod
 - iv. Vertical concealed rod exit device: Von Duprin (Basis of Design) or Precision
 - v. Push/pulls: Trimco, Ives, or Von Duprin.
 - vi. Specify filler strip between exit device and glass to prevent chaining the doors from inside.
- f. Flush bolts: Trimco, Ives
- g. Automatic flush bolts: Trimco, Ives

- h. Keyed removable mullion: Von Duprin (basis of design), Stanley. Finish to match storefront color. Provide Best SFIC compatible cylinders.
- i. Doorstops, Overhead Door Stops, and Holders: Glynn-Johnson, Rixson
- j. Smoke gaskets and weather-stripping: Pemko; Sealeze; National Guard.
- k. Magnetic door hold opens: LCN; Rixson
- l. Magnetic door locks: Von Duprin; Or Alternate Brand or Substitution Request required
- m. Door operators, included ADA Doors: LCN: No Alternate Brand or Substitution Request allowed. Provide concealed switches for power and control.
- n. Electronic locksets:
 - i. Cylindrical Wired: Best 9KW or Schlage AD-300
 - ii. Mortised Wired: Best 45HW or Schlage AD-300
 - iii. Cylindrical or Mortise Wireless: Schlage AD-400, Brand Name Only.
 - iv. Exit Hardware: Interior doors for the locking door panel (when in pairs) are to be electronic trim for locking and similar to Von Duprin Quiet Electric Latch (QEL) functionality for ADA operated doors. Exterior doors or the non-locking door to be QEL functionality with non-electronic trim for ADA-operated exterior on warm vestibule with latch bolt monitor (LX) function to be controlled by access control system.
 - I. Provide latch monitoring and request to exit monitoring for all Exterior Doors exit hardware.
 - II. Ensure locking trim is matched up with the door stile width and set up for locking/unlocking. Avoid latch retraction as a means of keeping doors unlocked.
 - III. Require Fail Secure unless otherwise directed.
- o. Power Transfer Devices or Electronic Power Transfer (EPT) Devices: Von Duprin EPT, Securitron concealed electronic power transfer (CEPT), Security Door Controls power transfer mortise (PTM).
- p. Weather-stripping. Provide compression weather-stripping at stops at aluminum doors. At other locations: sliding weather-stripping retained in adjustable strip mortised into door edge. Self adhesive rubber/vinyl compression type.
- q. Coordinators: Ives, Door Controls, Rockwood
- r. Power Supplies: Von Duprin, sized sufficient to operate the specified door hardware including inrush current. Must include multiple input/output control

board. All security related enclosures shall be furnished with a manufactured supplied lock with key.

- s. Thresholds: Pemko
- t. Finish: All hardware to be finished to the 619 Satin Nickel.
- u. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution

- a. Specify that installer shall not use a drill motor to install screws in door hardware.
- b. Specify thermal breaks in all systems including areas where exterior finishes may carry cold into the building such as sidewalks. Thermally broken thresholds are a required element.
- c. Keyed Removable Mullion Required On Double Door Entries Unless Each Door Has Its own Frame

- d. See Table 3-1 for typical hardware for exterior entries

Table 3-1. Typical Exterior Entry Hardware		
ADA NON-LOCKING		
EXIT DEVICE	LX-QEL-98L-LD 996L-BE	VON DUPRIN
DOOR OPERATOR	4642	LCN
POWER TRANSFER	EPT-10	VON DUPRIN
CLOSER*	4040XP SCUSH	LNC
ADA LOCKING		
EXIT DEVICE	LX-RX-QEL-98L-LD E996L	VON DUPRIN
DOOR OPERATOR	4642	LCN
POWER TRANSFER	EPT-10	VON DUPRIN
CLOSER*	4040XP SCUSH	LCN

*coordinate closer part number with the degree of opening of the door.

SECTION 08 80 00 – GLAZING

Section Includes: Glazing and glazing accessories.

1. Design Requirements

- a. Exterior glazing shall be 1-inch-thick insulated glazing units meeting the following performance requirements:
 - i. NFRC winter nighttime U-Value: 0.24 maximum
 - ii. Solar heat gain coefficient (SHGC) : 0.35 maximum
 - iii. Light to Solar Gain ratio (LSG): 1.4 minimum
 - iv. Low-E coating applied to the third surface
 - v. Exterior glazing sealants shall accommodate joint movements resulting from temperatures ranging from minus 35 to 100°F.
 - vi. Exterior sealants shall be installed only at air and substrate temperatures above 40°F.
 - vii. Select a high-performance insulating glass unit such as Solera or Kalwall when a high percentage of transparency is not a driving factor and U-value, shading coefficient (SC), and SHGC are better than a sealed insulating glass unit.
 - b. Decorative film is required on all full-height, interior-glazed panels to prevent bodily injury and damage.
 - c. Electrochromic Privacy Glazing
 - i. Electrochromic laminated glass units on clear glass with transparent optical coating.
 - d. Transparent Mirror Glass
 - i. ¼-inch thickness
 - ii. Pyrolytic coating
 - iii. Visible transmittance of 11%
 - iv. Visible Reflective coated side 68%
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
 3. Execution
 - a. Architect to review all glass/mirror panel cuts before fabrication.
 - b. Provide finished, smooth edge at all glass corners and butt joints, ¼-inch minimum gap to be sealed with clear silicone, U.O.N.

SECTION 08 83 00 – MIRRORS

Section Includes: Unframed, silvered flat glass mirrors including annealed monolithic, film-backed, laminated, and tempered.

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products
 - a. At restrooms, provide individual mirrors.
 - b. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Quality Assurance
 - i. Installer Qualifications: A qualified Installer, who employs glass installers for this Project who are certified under the National Glass Association's (NGA's) Certified Glass Installer Program.

SECTION 08 84 00 – PLASTIC GLAZING

Section Includes: Monolithic acrylic glazing, Monolithic polycarbonate glazing, Multi-walled structured polycarbonate glazing.

1. Design Requirements (no specific guidance- just best practices below)
 - a. Preconstruction Testing
 - i. Specify Preconstruction Adhesion and Compatibility Testing: Test each plastic glazing type, tape sealant, gasket, glazing accessory, and glazing-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - b. Plastic Glazing Labeling: Identify plastic sheets with appropriate markings of applicable testing and inspecting agency, indicating compliance with required fire-test-response characteristics.
2. Products
 - a. Plastic Glazing, General
 - b. Glazing Publication: Comply with published instructions of plastic glazing manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
 - c. Plastic Glazing Labeling: Identify plastic sheets with appropriate markings of applicable testing and inspecting agency, indicating compliance with required fire-test-response characteristics.
 - d. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Glazing, General
 - i. Comply with combined written instructions of manufacturers of plastic glazing materials, sealants, gaskets, and other glazing materials

unless more stringent requirements are indicated, including those in referenced glazing publication.

- ii. Glazing channel dimensions indicated on Drawings are designed to provide the necessary bite on plastic glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust plastic glazing lites during installation to ensure that bite is equal on all sides.
- b. Cleaning and Protection
 - i. Remove and replace plastic glazing that is damaged during construction period.

SECTION 08 88 13 – FIRE-RATED GLAZING

Section Includes: Fire-protection-rated glazing, Fire-resistance-rated glazing.

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products
 - a. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - b. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 - c. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.
 - d. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Quality Assurance
 - i. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the NGA's Certified Glass Installer Program.
 - a. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.

SECTION 08 88 53 – SECURITY GLAZING

Section Included with 08 50 00 – Windows

SECTION 08 95 16 – WALL VENTS

Section Included in 07 40 00 – Metal Roofing and Siding

DIVISION 09 – FINISHES

1. General Considerations
 - a. Durability: Finishes to be constructed of quality materials that promote performance and longevity.
 - b. Maintenance: Finishes to be easy to maintain and compatible with SCF preferred cleaning solutions.
 - c. Life Safety: Finishes to be environmentally friendly and aid in a healthy and efficient space. Red List materials are strictly prohibited.

SECTION 09 19 00 – MAINTENANCE OF FINISHES

General Contractor to provide O&M information from each manufacturer to Building Owner.

SECTION 09 20 00 – GYPSUM BOARD

Section Includes: Gypsum board assemblies, non-structural metal framing.

1. Design Requirements
 - a. Accent ceilings with curved profiles in Lobby and Reception are preferred.
 - b. Provide gypsum panel products with 100% recycled paper faces and maximum recycled core content, and no measurable quantities of mercury or mercury compounds.
 - c. Abuse resistant gypsum board shall be used at high traffic public areas including corridors and lobbies up to a height of 96 inches above finished floor (AFF).
 - d. Moisture resistant glass-mat faced gypsum board shall be used at interior wet/damp locations and areas subject to humidity and/or moisture contact including emergency wash stations, toilet rooms, janitor's closets, rooms housing fluid conveying machinery and equipment, mechanically humidified spaces, etc.
 - i. Mechanically humidified spaces shall include vapor retarders in perimeter walls, ceilings, and floors (as required) in accordance with 07 26 00.
 - e. Gypsum wallboard control joints shall be located no more than 30 feet apart.
 - i. Clearly identify control joint locations in public areas on Drawings and/or specifications.
 - ii. Field coordinate additional control joint locations during construction.
 - f. Non-structural metal framing for interior walls and ceilings shall be designed with a deflection limit of L/360, or as required for the intended finish, whichever is more stringent.

- g. Gypsum, Cement, or Veneer Plastering
 - i. Stucco not permitted on new projects.
 - ii. Existing exterior stucco to be patched and repaired when not replacing. Replace material if possible.
- h. Total control of sound transmission between rooms is required between classrooms, private offices, conference rooms., exam and procedure rooms. In those areas the ceilings shall follow the latest FGI guidelines for NRC, CAC, and AC. Provide acoustic gypsum to help control sound transmission, when partitions do not extend to the deck.
- i. Blocking is required at all wall-mounted equipment, fixtures, and furniture anticipated during design and construction.
- j. Gypsum board finish shall be in accordance with Gypsum Association's GA-214-10, Levels of Gypsum Board Finishing.
 - i. In occupied spaces, finish shall be level 4 minimum.
 - ii. In accessory spaces such as mechanical, electrical, janitor closets, etc. level 3 is acceptable.
 - iii. In areas of wallcovering or wall-mounted graphics such as vinyl decals or similar shall be level 5.

2. Products

- a. Abuse resistant gypsum:
 - i. National Gypsum's "Hi-Abuse XP Gypsum."
 - ii. USG Corporation's "Fiberock Brand VHI (Very High Impact) Gypsum."
 - iii. Or pre-approved equal.
- b. Moisture resistant glass-mat faced gypsum
 - i. USG's "Sheetrock Brand Glass-Mat Panels Mold Tough"
 - ii. CertainTeed's "Glasroc"
 - iii. Or pre-approved equal.
- c. Acoustic gypsum:
 - i. CertainTeed's "SilentFX QuickCut Drywall"
 - ii. USG's "Ensemble Acoustical Drywall Ceiling"
 - iii. Or pre-approved equal.
- d. Sustainability
 - i. Provide GREENGUARD certified

3. Execution

- a. Instances of radial edges are to be approved by Architect before final finish.
- b. Gypsum board fasteners and seams are to be taped, mudded, sanded, and primed for preparation of schedule finishes.
- c. Scored Gypsum, when used to fabricate a curved wall, should have a minimum spacing of ¼ inch.

SECTION 09 30 00 – CEILINGS AND ASSEMBLIES

Section Includes: Acoustical ceilings systems and wood ceilings.

1. Design Requirements

- a. Gypsum ceilings:
 - i. Should be limited to accent ceilings, bulkheads, soffits, or other areas where a hard-lid ceiling is required.
 - ii. Acoustic gypsum to be considered for areas where higher sound attenuation is required.
- b. Wood ceilings:
 - i. For use as an accent in Lobby and Reception spaces.
 - ii. Enhance the natural wood grain. Medium to dark stain is preferable.
 - iii. Irregular planking (length, width, pattern) and organic shapes are preferred.
 - iv. Suspended assemblies to have concealed hardware,
 - I. Dark paint behind assembly to conceal building mechanical systems required.
- c. Acoustic Ceiling Panel Assemblies:
 - i. Suspension systems shall be Class A, 15/16-inch grid face, heavy-duty, hot-dipped galvanized with baked paint finish. Specify stainless steel or aluminum finish suspension systems for high humidity locations. Provide wall angles and splices for complete installation.
 - ii. 24- x 48-inch acoustical ceilings are preferred for adequate maintenance access. Seek authorization from SCF before including 24- x 24-inch or 48- x 48-inch acoustical ceiling panels in design.
 - I. 48- x 48-inch panels damage easily and are difficult to manage, but SCF will consider for accent ceilings.
 - iii. Concealed spline and Tegular ceiling systems are not permitted.
 - iv. Field painting acoustic ceiling panels is not permitted.
 - v. Ceilings installed in laboratories, food preparation areas, clean rooms, and healthcare areas should be an inorganic product with a non-perforated surface resistant to the growth of mold, mildew, and bacteria; washable, scrubbable, soil-resistant and resistant to applied chemical solutions.

- vi. Coordinate ceiling tile selection with the lighting system. When using indirect lighting systems, select ceilings with light reflectance values of .89 or higher. For direct and indirect lighting applications, ceilings to have a light reflectance value of .80 or higher.
 - d. Specify ceiling panels with consideration to acoustical performance. Total control of sound transmission between rooms is required between classrooms, private offices conference rooms, exam and procedure rooms. In those areas the ceilings shall follow the latest FGI guidelines.
2. Products
- a. General ACP:
 - i. Armstrong's "Optima Lay-in"
 - ii. Armstrong's "Ultima Lay-In"
 - iii. Or pre-approved equal.
 - b. Sterile ACP:
 - i. Armstrong's "Optima Health Zone"
 - ii. Armstrong's "Calla Health Zone"
 - iii. Or pre-approved equal.
 - c. High sound attenuation ACP:
 - i. Armstrong's "Calla High NRC"
 - ii. Armstrong's "Calla High CAC"
 - iii. Or pre-approved equal.
 - d. Sustainability
 - i. Provide Greenguard Gold certified products.
3. Execution
- a. Specify overage/attic stock of each finish- equivalent to 5% of the total installed area.
 - b. Exposed edges to be finished.
 - c. ACP ceiling installations to terminate into gypsum surface, either flush or off-set is acceptable.
 - d. ACP installations that terminate into perimeter glazing are to be set back a min of 6 inches with edge trim.
 - e. Drop ceilings with exposed edges, such as clouds or stand-off perimeter installations, to receive axiom trim.
 - f. Shadow molds to be used in areas where ACP terminates into a vertical surface.
 - g. Store materials on elevated platforms, under cover, and in a dry location. Do not use materials that have become damp.

SECTION 09 50 00 – TILING

Section Includes: Ceramic, glass, porcelain, and stone tiling.

1. Design Requirements

- a. SCF preferred floor tiles:
 - i. Honed quarry tile
 - ii. Unglazed porcelain tile
 - iii. Natural stone
 - I. Granite is favored
- b. Provide floor tiles in high traffic, public spaces like lobbies and reception areas.
- c. Floor tiles shall be thin modular units and comply with IBC's most current static coefficient of friction regulations.
- d. Sizes of floor tiles are not limited but shall not inhibit slope to floor drains.
- e. SCF preferred wall tiles:
 - i. Glazed, ceramic tile.
 - ii. Through-body preferred, color-body acceptable.
 - iii. The size of wall tile is not limited.
 - I. Large slabs, greater than 48 x 48 inches, tile to be installed by the manufacturer's certified installer.
- f. Provide wall tile in restrooms, behind sinks,
- g. Install tiles in accordance with the most current version of the Tile Council of North America (TCNA) Handbook.
- h. The use of a high-quality waterproofing sealer is recommended on natural stone material.
- i. Slate is not permitted.
- j. Where possible, specify preformed corners and trim pieces.
- k. Use sanded grout for floor applications and unsanded grout at wall applications. Grout should be sealed per manufacturers recommendations.
- l. White grout is unacceptable.
- m. 1/8-inch grout line thickness is preferred, 1/4 inch maximum.
- n. Provide raised thresholds, centered under door, where tile meets a dissimilar flooring material.
- o. Tile substrates are to be moisture/mold/mildew resistant. Refer to GA-238-03 for guidelines for prevention of mold growth on gypsum wallboard.
- p. Use a waterproofing membrane at showers and other water intensive areas such as emergency wash stations and mop sink locations.
- q. Provide floor drains where necessary.
- r. Provide drawing details of shower base and install tile to achieve positive drainage.

- s. In areas where two types of flooring material meet, provide a flush, stainless steel edge trim. Square profiles are preferred, rounded acceptable only on wall installations.
 - i. Radial trim edge boundaries to be approved by the Architect before finished flooring installation.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution
 - a. In areas with accent drop ceilings, a mirrored flooring material change is preferred.
 - b. Installation of floor tiles at doorway thresholds shall be a full tile, a minimum of $\frac{3}{4}$ the total tile size is acceptable.
 - c. In areas where tile edge trim is not feasible, all exposed tile edges to be finished smooth to touch.
 - d. In areas such as restrooms and kitchens, provide wall tile up to 4-ft 0-inch minimum AFF.
 - e. Protective wall panels are acceptable in back of house (BOH) areas.
 - f. Quantitative humidity testing shall be conducted before installation of floor finish(es).
 - g. Specify overage/attic stock of each finish- equivalent to 5% of the total area each respective finish is installed.
 - h. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
 - i. Cold Weather Requirements: Do not build on frozen substrates. Remove and replace units damaged by frost or freezing conditions. Installation only to be performed when air temperature is above 40 F for a minimum of 48 hours.
 - j. During conditions where this temperature cannot be maintained, tenting with waterproof sheeting and heating is an approved method for installation whereby the air temperature can be maintained to allow for installation and curing, as recommended in section "2104.3 Cold Weather Construction" of the International Building Code.
 - k. Installation is not to begin until all substrates have been properly prepared before installation.
 - l. Establish lines and levels before installation.
 - m. Commencement of work by installer is acceptance of substrate.
 - n. Installation is not to occur where overhead work is taking place at any time.

SECTION 09 60 00 – FLOORING

Section Includes: Flooring adhesives, concrete, masonry, resilient, wood, and wood athletic flooring, and wall base.

1. Design Requirements

- a. Preference is given to products that require minimal maintenance, avoid products that require routine polishing via wax or other topcoat.
- b. Comply with IBC's most current static coefficient of friction regulations.
- c. FloorScore certified products preferred.

2. Products

- a. Flooring Adhesives:
 - i. Use adhesives with the following limits for VOC content:
 - I. Rubber Floor and Base Adhesives: Not more than 25 g/L.
 - II. Cove Base Adhesives: Not more than 25 g/L
 - III. Ceramic Floor and Wall Tile Adhesives: 2 g/L
 - ii. Preference for modular carpet tile installation is a "no glue installation" by connecting the carpet modules together. The connectors shall contain no liquid components and shall have "zero" calculated VOCs.
 - iii. Adhesives for broadloom carpet must contain antimicrobial preservative and have "zero" calculated VOCs.
- b. Concrete Flooring
 - i. All exposed concrete slabs not receiving additional floor coverings shall be sealed with penetrating sealer.
 - ii. If floor stripping is required, sealant to be applied first.
 - iii. Provide non-slip additive for high-traffic areas.
- c. Rubber Base:
 - i. 100% rubber content is preferred.
 - ii. 1/8-inch gauge.
 - iii. White/light colored base is unacceptable.
 - iv. For carpeted areas use a 4-inch height, straight profile.
 - I. 6-inch height in healthcare, laboratory, and food preparation applications is preferred.
 - v. For hard surface floor areas use a 4-inch height, cove profile.
 - I. 6-inch height in healthcare, laboratory, and food preparation applications is preferred
 - vi. Base will be manufactured in 120-ft coils. Corners will be formed in the field.
 - I. Changes in base color/type/height are not allowed at outside corners.
- d. Tile Base:
 - i. For areas where floor tile is specified.
 - ii. Floor tiles cut to size for use as wall base acceptable only with edge trim.
 - iii. Grout lines align with flooring grout lines.

- iv. 4-inch high is acceptable for most applications.
 - v. 6-inch high, cove profile for healthcare, laboratory, and food preparation applications is preferred
 - vi. All corners are to be miter cut.
 - vii. The use of a high-quality waterproofing sealer is recommended on natural stone material.
 - viii. Provide metal, termination trim.
 - ix. If edge trim is not feasible, round tile edges with 3/16-inch radius brazed diamond router bit and finish by sanding with 1500 to 3000 grit sandpaper for a polished edge.
- e. Access Flooring:
- i. Provide access flooring where mechanical component management cannot be done within plenum space.
 - ii. Design to consider load bearing capacity, need for air flow, and seismic requirements.
- f. Epoxy Flooring:
- i. Coatings (4 – 30 mils) or slurries (30 – 250 mils) are preferred over mortar mixtures (125 – 250+ mils).
 - ii. Mortar mixtures require a certified installer.
 - iii. Proper subfloor surface preparation is critical to successful installation of fluid applied flooring. Degrease, grind and removal all particulates from the installation area.
 - iv. Provide a primer coat to promote adhesion and seal the subfloor.
 - v. Do not provide fluid applied flooring near perimeter walls where freeze/thaw conditions occur.
- g. Resilient Flooring:
- i. Rubber materials are preferred where allowable by code.
 - ii. Vinyl/vinyl composite materials are discouraged.
 - iii. Homogenous sheet goods are preferred.
 - iv. Heterogeneous sheet goods are acceptable.
 - v. Composite rubber/cork resilient flooring is acceptable where allowable by code.
 - vi. Natural and organic patterns/textures are preferred.
 - vii. High clarity printed wood textures are required. Printed wood textures to have light to medium tone variation. Excessive rustic textures are not recommended.
 - viii. High clarity printed stone textures are required. Faux granules to be micro to medium in size.
 - ix. Faux grout line products are discouraged.
 - x. Textures with deep embossing are prohibited.

- xi. Light colored flooring is not acceptable.
 - xii. High- sheen resilient flooring is not acceptable in high-traffic areas.
 - xiii. Avoid installation patterns that run parallel to long spans of architectural elements such as walls or column grids, this will mask any unforeseen creep or misalignments.
 - xiv. Slip resistant, heat- welded sheet vinyl flooring is preferred in food preparation, laboratory, and healthcare areas.
 - xv. Provide integrated, contrasted strip at stair nosing for tread visibility.
 - xvi. A material with increased slip resistance is preferred.
 - xvii. Minimum resilient tile and plank requirements:
 - I. Tile: 24-inch x 24-inch x 3-mm thickness
 - II. Plank: 3-inch x 24-inch x 3-mm thickness
 - xviii. Minimum 6 mil wear layer.
 - xix. Tight seam and flush installation required to achieve a water-tight assembly.
 - xx. Preferred sheet requirements:
 - I. 6-ft-0-inch x 35-ft-0-inch- 45-ft-0-inch length x 3-mm thickness
 - II. Seamless heat welded application is preferred.
 - III. Minimum 6 mil wear layer
 - xxi. Meet the performance requirements of ASTM F 1859, Type I, Standard Specification for Rubber Sheet Floor Covering without backing.
- h. Static Dissipative Flooring:
- i. For use in areas where static control is necessary to protect sensitive electronic equipment, flammable materials, or human safety.
Examples include:
 - I. Computer training spaces
 - II. Data storage spaces
 - III. Pharmaceutical production spaces
 - IV. Hyperbaric spaces in healthcare settings
 - V. Provide copper grounding strips before static dissipative tile (SDT).
 - VI. Vinyl SDT requires use of static-control heel straps, toe straps, sole straps or ESD shoes for optimum dissipative effects.
- i. Wood Flooring:
- i. Generally wood flooring will be limited in use, and only for stages, auditoriums, gymnasiums and possibly in upgraded portions of private office areas.
 - ii. Wood athletic flooring will meet the performance requirements of an Anchored Resilient Floor System, per EN-14904 Standards

- iii. Wood flooring for auditoriums and office type spaces will be solid wood $\frac{3}{4}$ -inch thickness, Capability for multiple refinishes to top layer required.
 - iv. Northern hard maple is a preferred species of wood. First grade maple will be specified, and flooring will be installed to comply with Maple Flooring Manufacturers Association standards.
- j. Sustainability
- i. Select high renewable materials, sourced from eco-friendly resources. Avoid VOC's as much as possible.

3. Execution

- a. Floor seaming diagram required for Architect's approval before installation.
- b. All hard-surface flooring to be continuous beneath architectural elements, such as casework, reception desks, and built-in benches.
- c. Specify overage/attic stock of each finish- equivalent to 5% of the total area each respective finish is installed.
- d. Prepare the subfloor and install floor finishes in accordance with the manufacturer's requirements.
- e. Wall base to be installed tightly to floor finish, gaps larger than 1/8 inch filled with sealant not acceptable.
- f. Quantitative humidity testing shall be conducted before installation of floor finish.
 - i. Examples of quantitative humidity testing are done with calcium chloride kits or relative humidity meters- plastic sheet test is not acceptable as this is a qualitative test.
- g. Store materials susceptible to moisture damage on elevated platforms, under cover, and in a dry location. Do not use materials that have become damp.
- h. Cold Weather Requirements: Do not build on frozen substrates. Remove and replace units damaged by frost or freezing conditions. Installation only to be performed when air temperature is above 40 F for a minimum of 48 hours.
- i. During conditions where this temperature cannot be maintained, tenting with waterproof sheeting and heating is an approved method for installation whereby the air temperature can be maintained to allow for installation and curing, as recommended in section "2104.3 Cold Weather Construction" of the International Building Code.
- j. Installation is not to begin until all substrates have been properly prepared before installation, including necessary flashings, transitions, flatwork and penetrations in stone areas.
- k. Establish flooring transitions and pattern start point before start of installation.
- l. Commencement of work by installer is acceptance of substrate.
- m. Installation is not to occur where overhead work is taking place at any time.

SECTION 09 68 00 – CARPETING

Section Includes: Tile carpeting

1. Design Requirements

- a. Modular carpet tiles are preferred over roll or broadloom stock.
 - i. Two types of carpet are preferred.
 - i. Carpet A - will typically be used for classrooms, corridors, and office spaces.
 - ii. Carpet B - will typically be used in building entry vestibules.
- b. All carpet shall beCRI Green Label Plus certified.
- c. Natural and organic patterns/textures are preferred.
- d. Light colored flooring is not permissible.
- e. Walk-Off Mats
 - i. Used at entryways and vestibules
 - ii. Depressed slab systems are discouraged
 - iii. To extend a minimum of 12 feet into the building
 - iv. Fibers to be rigid and abrasive for maximum debris removal
 - v. Color and pattern should aid in hiding dirt/discoloration

2. Products

- a. Sustainability
 - i. Use recyclable carpet with high recycled content that utilizes current technology.
 - ii. Flooring Adhesives:
 - I. Use adhesives with the following limits for VOC content:
 - II. Rubber Floor and Base Adhesives: Not more than 25 g/L.
 - III. Cove Base Adhesives: Not more than 25 g/L
 - iii. Ceramic Floor and Wall Tile Adhesives: 2 g/L
 - I. Preference for modular carpet tile installation is a "no glue installation" by connecting the carpet modules together. The connectors shall contain no liquid components and shall have "zero" calculated VOCs.
 - iv. Adhesives for broadloom carpet must contain antimicrobial preservative and have "zero" calculated VOCs.

3. Execution

- a. Floor seaming diagram required for Architect's approval.
- b. Specify overage/attic stock of each finish, equivalent to 5% of the total area each respective finish is installed.
- c. Quantitative humidity testing shall be conducted before installation of the floor finish.

- d. Installation is not to begin until all substrates have been properly prepared before installation, including necessary flashings, transitions, flatwork and penetrations in stone areas.
- e. Establish flooring transitions and pattern start point before installation.
- f. Commencement of work by installer is acceptance of substrate.
- g. Installation is not to occur where overhead work is taking place at any time.

SECTION 09 70 00 – WALL FINISHES

Section Includes: Wallcoverings, stone and wood veneer.

1. Design Requirements

- a. Provide additional blocking for hanging artwork, wall-mounted monitors, and other items scheduled to be affixed to walls. (case by case)
 - i. Establish design intent during early design stages for proper coordination of wall hung elements.

2. Products

a. Stone Veneer:

- i. Provide stone veneer as an accent wall. Size of installed area is not limited, but placement should consider high- traffic, public spaces to maximize design impact, ex. Lobbies, exposed staircase, reception/waiting area, continual material from interior to exterior, where glazing occurs.
- ii. Provide standard sample board consisting of small-scale pieces of veneer units showing full range of textures and colors.
- iii. When installing stone, achieve a balanced pattern of shapes and colors by mixing the various sizes and textures of stone, and mixing stones from different boxes throughout the installation.
- iv. Stones should be installed with uniform size grout joints. A consistent $\frac{3}{8}$ -inch or less space around the stones is desirable.
- v. Cut edges should be turned so they are not visible, and the edges are concealed with mortar when grouting.
- vi. The use of a high-quality waterproofing sealer is recommended on natural stone material.
- vii. The use of mortar is recommended for exterior applications, construction adhesive is recommended for interior applications.

b. Wood Veneer:

- i. Wood veneer should be limited to FSC-certified products.
- ii. The recommended application for wood veneer is as follows:
 - I. Specialty casework/millwork
 - II. Ceiling accent finish
 - III. Faux beam appearance

- IV. Wall cladding/paneling
 - iii. Architect to review the matching technique per each application.
 - iv. All product received to be inspected and confirmed free of defects.
 - v. Plywood substrates are required. Particleboard substrates are not permitted.
 - vi. Wood veneer is not permitted in wet areas.
 - vii. Architect to specify a veneer grade based on the following:
 - I. AA: A premium face grade for exclusive uses such as architectural paneling and interiors, case goods and quality furniture.
 - II. A: Where AA is not required, but excellent appearance is still important.
 - III. B: Where the natural characteristics and appearance of the species are desirable.
 - IV. C: Allows for unlimited color and increased natural characteristics. Perfect for applications where an economic panel is needed.
 - V. D & E: Provides a sound surface but allows unlimited color variation and repairs in increasing size ranges. Applications: where the surface will be hidden, or a more rustic character is desired.
 - c. Textile Wallcovering:
 - i. Use of vinyl wallcoverings is discouraged. Type II required if approved for new work.
 - ii. High performance, textile wall coverings are preferred. These products will be woven, durable and easily cleaned. Fibers will be either polyester, vinyl coated polyester or polyethylene.
 - iii. If other types of wallcoverings are considered, provide SCF with the maintenance procedures for their review and approval.
 - iv. Review scope of wallcovering application with SCF on a room-by-room basis to determine if this type of finish is warranted.
 - v. Class A fire-rated required.
 - vi. Bleach cleanable is preferred.
 - d. Sustainability
 - i. FCS Certified products is preferred.
3. Execution
- a. Wall-covering rolls installed horizontally on surfaces longer than the delivered manufactured roll's length is not acceptable. Avoid visible seams as much as possible.
 - i. Specialty wall finishes which require special expertise, equipment, or non-readily available products are discouraged.

- ii. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- iii. Cold Weather Requirements: Do not build on frozen substrates. Remove and replace units damaged by frost or freezing conditions. Installation only to be performed when air temperature is above 40 F for a minimum of 48 hours.
- iv. Installation is not to begin until all substrates have been properly prepared before installation, including necessary flashings, transitions, flatwork and penetrations in stone areas.
- v. Establish lines and seaming before installation.
- vi. Commencement of work by installer is acceptance of substrate.
- vii. Installation is not to occur where overhead work is taking place at any time.
- viii. Specify overage/attic stock of each finish- equivalent to 5% of the total area each respective finish is installed.

SECTION 09 84 00 – ACOUSTIC TREATMENT

Section Includes: Acoustical panels.

1. Design Requirements

- a. For areas which require acoustical wall products the designer will engage an acoustical engineering consultant to determine performance requirements.
- b. Preferred products to be specified based on an appropriate application per each room or space in which they are installed.
 - i. Gymnasium: Rigid acoustical panels, acoustic baffle.
 - ii. Auditorium and Large Lecture room: Perforated metal or wood veneer assembly with acoustic insert.
 - iii. Meeting Room: Field-fabricated stretched fabric acoustical/tack-able fabric panels.
 - iv. Office/open office: Perforated acoustic screens, acoustic pendant/light fixture, acoustic tackboard (desk-mounted screen and/or wall mount),
 - v. Provide partitions extended to the deck for clinical spaces that require white noise.
 - I. If not feasible, other options for sound attenuation are:
 - a) Acoustical drywall
 - b) Acoustical sealant at all joints/seams
 - c) Sound attenuation batt (SAB) in wall and above ceiling
- c. Rigid acoustical Panels:
 - i. Constructed of a composite core construction of dimensionally stable rigid fiberglass of medium 6-7 PCF density, laminated to a 1/16-inch

- resilient perforated co-polymer face sheet. Thickness will be determined by acoustical performance requirements.
 - ii. Square edge profile
 - iii. Mount panels using aluminum Z-Clips.
- d. Perforated wood panels:
- i. Consisting of a perforated dark low VOC fire-rated medium density fiberboard (MDF) with a ribbed natural wood veneer laminated to the face and an acoustically transparent black mat laminated to the back side. The plank is cut to fit on site and is typically installed on wood or steel furring (610-mm) 24-inch on center with insulation placed behind the panel. The plank has a tongue and groove edge, which is blind nailed to wood or screwed to steel furring channel mounting clips (supplied) to create a monolithic-looking joint.
 - ii. Panel face profiles and wood veneer species will be determined by the designer and submitted to SCF for approval.
 - iii. Standard factory stain finish is preferred.
- e. Field fabricated stretched fabric acoustical/tackable fabric panels:
- i. Stretched fabric panel system shall consist of continuous perimeter and butt seam mounting extrusions, site-fabricated, and applied directly to substrate.
 - ii. Facing fabric shall be stretched over core materials, leaving fabric floating above core surface. Fabric facing application shall not utilize adhesives, nails, tacks, screws, or tapes. Nails, tacks, screws or similar items shall not be installed through facing fabric to secure panel.
 - iii. System shall allow for removal and replacement of fabric facing from individual panels. Removal of fabric shall provide access to surface behind fabric, without dismantling, removal, or replacement of mounting extrusions or core material.
 - iv. Thickness of panel will be determined by acoustical performance requirements.
 - v. Size and profile of reveals between panels will be determined by the designer.
 - vi. Core material will be multi-density fiberglass and have acoustical as well as tackable properties and capabilities.
 - vii. Stretched fabric covering will have same performance and material requirements set forth under textile wallcoverings.
- f. All acoustical panels shall have a Class A fire rating in accordance with ASTM E-84 with a flame spread of 25 or less.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution

- a. Preparation and installation of all acoustical panels shall be in compliance with the product manufacturer's recommendations and instructions.

SECTION 09 90 00 – PAINTING

Section Includes: Paint, stain, and coating

1. Design Requirements

- a. Paint color selection shall comply with the process described in Part 2 of Standards, per SCF color requirements.
- b. Prepare all surfaces and materials and apply in accordance with the paint manufacturer's application instructions.
- c. Specify one primer and two finish coats, minimum, for each surface.
- d. Paint wall surfaces behind permanently fixed equipment or furniture with prime coat.
- e. Prime or seal the edges, ends, faces, undersides and backsides of wood, including cabinets, counters, cases and paneling.
- f. Back-prime paneling where masonry, plaster or other wet wall construction occurs on backside.
- g. Seal tops, bottoms and cutouts of unprimed wood doors.
- h. Finish exterior doors on tops, bottoms and side edges the same as exterior faces.
- i. Preferred Paint Types and Sheens for Identified Substrates:
 - i. Painted Doors: Semi-gloss alkyd.
 - ii. Handrail Systems: Semi-gloss alkyd.
 - iii. Glassware Washing Rooms: Full gloss alkyd, waterproof epoxy systems
 - iv. Sterilizing/Autoclave Rooms: Full gloss alkyd.
 - v. Office Walls: Eggshell interior latex system.
 - vi. Classroom Walls: Eggshell interior latex system.
 - vii. Typical Lab Walls: Eggshell interior latex system.
 - viii. Corridor Walls: Eggshell interior latex system.
 - ix. Interior Masonry Walls: Block filler and Eggshell interior latex.
 - x. Interior Metal Doors/Frames: Semi-gloss alkyd.
 - xi. Interior Wood: Polyurethane; satin finish
 - xii. Ceilings: flat interior latex system.
 - xiii. Exam Room: Semi-gloss alkyd.
 - xiv. Procedure Room: Full gloss alkyd, waterproof epoxy systems
 - xv. Clinic Office: Eggshell interior latex system.
- j. Dark color, matte finish paint to be Dryfall type applied via spray applicator.

- i. It is recommended that paint color/type changes occur at inside corners.
 - ii. Outside corner color changes tend to chip due to exposure.
 - k. Specify General Contractor to provide keyed floor plans which identify all paint colors and their associated locations throughout the building at the end of construction. The keyed floor plans shall include a schedule of paint formulas identifying paint type, color, sheen, and number of coats. The keyed floor plans shall be included with the building O&M manuals and Record Documents at project close out.
 - l. Communicate to Stakeholder Group via SCF that individual building users and user groups are prohibited from repainting building interiors – including private offices – without prior approval from the SCF Director.
- 2. Products
 - a. Standard campus interior ceiling and wall paint is professional quality, zero VOC, interior latex.
 - i. Sherwin Williams ProMar 200 Zero VOC.
 - ii. Or pre-approved equal.
 - b. Standard campus interior trim/frame paint is professional quality, low VOC acrylic.
 - i. Sherwin Williams ProClassic Waterbased Acrylic-Alkyd
 - ii. Or pre-approved equal.
 - c. Sustainability
 - i. Use low VOC products
- 3. Execution
 - a. Dryfall paint to be used where dark, matte paints have been specified.
 - b. If lead paint is suspected to exist within work scope, do not disturb and immediately notify the Architect and Owner.
 - c. Perform preparation for painting of substrates known to include lead paint in accordance with EPA Renovation, Repair and Painting Rule and additional requirements of authorities having jurisdiction.
 - d. In occurrences of medium to dark paint, 3+ coats may be required to achieve a smooth, uniform appearance.
 - e. Caulk to be applied before final finish.
 - f. All items in exposed ceiling to be thoroughly cleaned before final paint finish.
 - g. Ceiling mounted elements, that may/may not penetrate vertical surfaces, to be painted with scheduled ceiling paint.
 - h. All painted mechanical elements/systems to be clearly labeled as required for prompt identification.
 - i. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates, or fire ratings.

- j. In occurrences of surface damage, proper patch and repair is required before touch-up painting.
- k. Touched up area is to be feathered into existing paint to achieve a smooth, uniform appearance.
- l. For a painted design utilizing a masking method, a crisp edge is best achieved using delicate strength painter's tape and following the steps below:
 - i. Apply Color 1 over the entire scheduled surface as a base, background paint- let dry.
 - ii. Apply painter's tape per new work design.
 - iii. Paint Color 1 on the edge of the tape where accent Color 2 is to meet- let dry.
 - iv. Paint Color 2 on top of the same edge painted in step above, Color 2 is to be confined to the tape's surface area- let dry.
 - v. Remove tape at 45-degree angle.
- m. Specify overage/attic stock of each finish- equivalent to 5% of the total area each respective finish is installed.

DIVISION 10 – SPECIALTIES

SECTION 10 20 00 – INTERIOR SPECIALTIES

Section Includes: Toilet compartments, toilet accessories, folding panel partitions, detention toilet accessories, signage

1. Design Requirements

- a. Detention Toilet Accessories:
 - i. Provide ligature-resistant toilet fixtures and accessories.
- b. Residential Restroom Accessories:
 - i. Toilet tissue dispenser
 - I. Sing-roll dispenser
 - II. Surface mounted
 - III. Stainless steel finish
 - ii. Shower curtain rod
 - I. 1 inch diameter
 - II. Friction fit
 - III. Stainless steel finish
 - iii. Medicine cabinet
 - I. Surface mount
 - a) 18- x 24-inch with mirror insert
 - b) Three adjustable shelves
 - c) Cabinet finish to be corrosion resistant
 - d) Mirror frame to be paint grade wood.
 - iv. Towel bar
 - I. Minimum of 24 inches long
 - II. ¾-inch square tube with rectangular end brackets
 - III. Stainless steel finish
 - v. Hand towel bar
 - I. Minimum of 8 inches long
 - II. Square tube with rectangular end brackets
 - III. Stainless steel finish
- c. Signage:
 - i. Interior room and wayfinding signage to be considered during early design stages.
- d. Laundry accessories:
 - i. Provide ample, freestanding, stainless steel trash receptacles throughout the space.
 - ii. Provide one communal table in central area for convenience.

- iii. Provide at minimum 1 bench, seating should be proportional to number of machines provided.
- e. Toilet partitions:
- i. Shall be:
 - I. Phenolic-Core, floor/pedestal mount
 - II. Plastic, floor/pedestal mount.
 - III. Type 304 stainless steel, floor/pedestal mount with continuous hinges on doors.
 - i. Wall and ceiling- hung partitions are not permitted.
 - ii. Privacy is a priority- Provide partitions with no sightlines between panels.
 - iii. Urinal screens may be wall mounted, and maintain a minimum of 12 inches AFF.
- f. Toilet accessories:
- i. Finish shall be Type 304 stainless steel.
 - ii. SCF contracts with a vendor to supply paper towel dispensers and soap dispensers. Architect should identify locations for dispensers on plans and elevations and provide backing in walls.
 - iii. Electric hand dryers are not permitted.
 - iv. Touchless infrared lavatory faucets are required: see Division 22.
 - v. Waste receptacles shall be stainless steel and located adjacent to paper towel dispensers *and* adjacent to restroom doors.
 - vi. Battery operated fixtures are not permitted.
 - vii. Provide a hands-free sanitary foot door opener inside restroom at restroom entrance door.
 - viii. Provide the following in each stall as required per gender:
 - I. Double toilet paper roll holder with locking compartment
 - II. Seat cover dispenser
 - III. Sanitary napkin dispenser
 - IV. Grab bars
 - V. Coat hook on back of door
- g. Diaper-Changing Stations
- i. Horizontal unit that opens by folding down from stored position with child-protection strap.
 - ii. Semi recessed mounted preferred but surface mounted acceptable
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 10 21 23 – CUBICLE CURTAINS AND TRACK

Section Includes: Curtains, tracks, and carriers for hospital cubicles.

1. Design Requirements
 - a. Curtain to be 15% longer than track length.
 - b. Antimicrobial fabric is preferred.
 - c. Fabric to be opaque, pre-shrunk, flame retardant, and closely woven.
 - d. Large scale patterns and white fabric are not permitted.
 - e. All curtains to be procured from a single source.
 - f. Minimum of 18 inches of mesh at top of curtain required.
 - g. Curtain to hang no more than 12 inches from the floor.
 - h. Track to be anchored every 24 inches.
 - i. Standard track bends include:
 - i. 90-degree bend with a 12-inch radius
 - ii. 90-degree bend with 60-inch radius
 - iii. 45-degree bend with a 12-inch radius
 - j. Furnish one carrier per every 4 inches of track, plus 10% extra for each track length.
 - k. Provide end stops at each end, one stop to be pull-out removable.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Deliver and store packed products in original containers with unbroken seals/labels intact until time of use.
 - b. Store delivered products inside in a clean, dry environment.
 - c. Physical samples to be delivered to SCF for approval before purchase.
 - d. Specify overage/attic stock of fabric- equivalent to 5% of installed material.

SECTION 10 22 33 – OPERABLE PARTITIONS AND DEMOUNTABLE SYSTEMS

Section Includes: Acoustical and fire-rated, manually and electrically operated folding partitions. Reusable, site-assembled or unitized-panel demountable partition systems, including solid panels, door panels and doors, glazed panels, and all-glass systems.

1. Design Requirements
 - a. Demountable Systems:
 - i. Not acceptable for new build-outs.
 - b. Operable Partitions:
 - i. For use in large spaces that require a flexible function.
 - ii. Continuously hinged panels in runs of 15 feet or longer are not permitted.
 - iii. For rooms with ceiling heights over 10 feet, evaluate the use of vertically retractable acoustic panels

- iv. Finish to be of a durable material that can withstand abuse.
 - I. Whiteboard finish on operable partitions is discouraged. If design requires a whiteboard finish, provide contrasting color and trim at edge to reduce accidental writing on non-whiteboard finish.
 - v. Preference is given to manual, horizontal systems for ease of maintenance.
 - I. The use of automatic, vertical systems should be limited.
 - vi. Minimum of 50 STC required.
 - vii. Operable partition is required to terminate into a solid, unobstructed wall.
 - I. If dividing a space perpendicular to glazing, provide wing wall at mullion for operable partition to terminate into.
2. Products
- a. Basis-of-Design
 - i. Modernfold
 - ii. Skyfold
 - iii. Or pre-approved equal.
 - b. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
- a. For existing facilities, the design team shall evaluate the existing infrastructure including structural, mechanical ventilation, and electrical before making recommendations to SCF.

SECTION 10 26 00 – WALL AND DOOR PROTECTION

Section Includes: Wall and door protection, corner guards.

- 1. Design Requirements
 - a. Door Protection required on all doors located in high-traffic areas, or subject to consistent abuse.
 - i. Provide a 10-inch-high stainless steel kick/push plate at doors in public spaces and healthcare facilities.
 - ii. Provide a kick/push plate taller than standard rolling cart at doors in BOH; coordinate with SCF equipment.
 - iii. Provide pinch guards at child play areas.
 - b. Corner Guards
 - i. Corner guards, or other protection, are required at all gypsum wallboard partitions in hallways, corridors, public lobbies and high-traffic areas.
 - ii. Stainless steel corner guards preferred.

- iii. Impact resistance PETG plastic with aluminum retainers, color to match painted partition are acceptable.
- iv. Plastic Corner guards shall have an NFPA Class A fire rating and be GREENGUARD certified and comply with ASTM-256, Impact Resistance of Plastic.
- v. Height: 48 inches, minimum; 96 inches preferred at high traffic and service areas.
- vi. Guards to start above wall base.
- c. Wall Protection:
 - i. Semi-rigid sheet designed for use in high-traffic areas that are subject to abuse from impact, gouges, and scratches.
 - ii. Chemical and stain-resistant finish preferred.
 - iii. Continuous wall protection is required at service entrances and locations where frequent use of wheeled carts, tables, and dollies is likely to occur.
 - iv. Chair rails or other protection are required with unfixed seating and tables.
 - v. Class A fire-rated required.
 - vi. Termination trim required at all exposed edges.

2. Products

- a. Preferred Manufacturers
 - i. Acrovyn
 - ii. Inpro
- b. Sustainability (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution

- 4. Protective wall panels to be installed with minimal seams.
 - a. 5% attic stock required for all types, colors, and textures of installed corner and wall protection.
 - b. Use theft-proof fasteners where exposed to view.
 - c. Double-faced foam tape not permitted as an installation method.

	Wallcovering	Semi-rigid Panel	Epoxy Paint	Chair Rail	Metal Cladding
Steril/ Lab			X		
Classrooms/ Offices	X				
Conference/ Huddles Rooms	X	X		X	
Corridors	X	X			
Exam Rooms	X	X			

Procedure Rooms			X		
Kitchens		X			X
Janitorial Rooms		X			

SECTION 10 40 00 – SAFETY SPECIALTIES

Section Includes: Photoluminescent egress signs, fire extinguisher, defibrillator, and safety cabinets.

1. Design Requirements
 - a. Blade sign required at fire and defibrillator locations, as to clearly indicate location at far distances.
2. Products
 - a. Exit signage
 - i. Provide red-colored exit signage
 - ii. Cross reference electrical
 - b. Photoluminescent egress signs
3. Are not approved unless existing conditions limit the use of powered illuminated signage.
 - i. Provide at all required locations as required by current Life Safety codes.
4. Acrylic signs with green edge-lighting and recessed mounted are preferred.
 - i. Architect to review quantities of differing directional chevron indicators before purchase.
 - b. Safety cabinets
 - i. Provide safety cabinets where flammable, hazardous materials are stored.
 - ii. Provide yellow prefinished cabinets, clearly labeled
 - iii. Cabinet doors to be self-closing and lockable.
 - iv. Cabinet design shall be approved by the SCF Safety Manager.
 - c. Fire extinguisher cabinets
 - i. Shall be stainless steel with clear tempered safety glass or polycarbonate lite.
 - ii. Shall be clearly identified with lettering on the face of cabinet door.

- iii. Fully recessed cabinet preferred, semi-recessed acceptable. All cabinets shall be ADA compliant. For existing buildings evaluate existing physical space restraints where semi-recessed are considered.
 - iv. Fire extinguishers located in public areas shall be housed in cabinets.
 - v. Consult with SCF on the use of lockable or nonlockable cabinets per project.
 - vi. Provide wall-mounted, V-shaped acrylic sign above each cabinet, red background with white lettering
 - I. Basis-of-design is MySafetySign S-8788 Projecting Sign
- d. Automatic external defibrillator cabinets
- i. Shall be provided in all campus projects.
 - ii. Each defibrillator to be shown on the evacuation plan, clearly indicated in the key plan.
 - iii. Shall be stainless steel with clear tempered safety glass or polycarbonate lite.
 - iv. Shall be equipped with battery operated anti-theft alarms.
 - v. Shall be clearly identified with lettering on the face of cabinet door.
 - vi. Fully recessed cabinet preferred, semi-recessed acceptable. All cabinets shall be ADA compliant. For existing buildings evaluate existing physical space restraints where semi-recessed are considered.
 - vii. Provide wall-mounted, V-shaped acrylic sign above each cabinet, white background with black lettering
 - I. Basis-of-design is MySafetySign S2-1803 Projecting Sign
5. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 10 51 13 – LOCKERS

Section Includes: Metal and Plastic Laminate- clad lockers

1. Design Requirements
2. Full height lockers with coat hooks are preferred for employee use. Provide double stacked lockers when sufficient area is not available
 3. Standard hasp, requiring a separate padlock are preferred.
 - a. Solid panel faces are required, vents optional.
 - b. Fully recessed units are preferred.

- i. In areas where lockers are not recessed- provide sloped top lockers, flat top lockers not permitted.
 - c. Securely anchor units per the manufacturer's instructions.
 - d. Ensure a tight installation when multiple units are ganged together.
 - e. Pharmaceutical Lockers:
 - i. Automated, conditioned units, in areas where patients can conveniently pick-up prescription medication.
 - ii. Coordinate with AV consultant and SCF to have security camera.
 - f. Metal Lockers:
 - i. For use where utilitarian, individual lockable storage is required.
- 4. Standard hasp, requiring a separate padlock are preferred.
 - a. Plastic Laminate Clad Lockers:
 - i. For use in public or private spaces that require individual lockable storage with more aesthetic appeal.
- 5. Provide fully recessed lockers with built-in digital locks.
- 6. Products
 - a. Pharmaceutical Lockers
 - i. iLOCALBOX
- 7. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 10 55 00.13 – POSTAL SPECIALTIES

Section Includes: United States Postal Service (USPS) - approved postal-delivery and collection equipment, lockers, slots. Private Postal-delivery and collection equipment for facilities *not* serviced by the United States Postal Service (USPS).

- 1. Design Requirements
 - a. All required equipment to be approved by the USPS to ensure compliance with current codes.
 - b. Private Postal-delivery units:
 - i. Package lockers to be provided in residential applications.
 - I. Package centers, where package lockers are not approved, shall consist of oversized, labeled cubbies or adjustable shelving units and a community table.
 - ii. The space plan should allow for extra unencumbered wall/floor space, either directly adjacent or adjoined to the general mail area, that serves as a supplementary area for sorting packages.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 10 80 00 – OTHER SPECIALTIES

Section Includes: Pest control devices, grilles, screens, flags, banners, clocks, security domes.

1. Design Requirements
 - a. Tobacco free banners
2. Flagpoles, if provided shall be lit at all times
 - a. Analog clocks to be selected and furnished by SCF
3. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
4. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 11 – EQUIPMENT

SECTION 11 12 00 – PARKING CONTROL EQUIPMENT

Section Includes: Automatic barrier gates, vehicle detectors, traffic controllers, ticket dispensers, exit terminals, pay stations, fee computers, management software, and access control units.

1. Design Requirements (no specific guidance given- below is best practice)
 - a. Preinstallation Meetings
 - i. Preinstallation Conference: Conduct conference at Project site.
 - b. Action Submittals
 - i. Product Data: For each type of product.
 - ii. Shop Drawings: For parking control equipment.
 - I. Include plans, elevations, sections and attachment details.
 - II. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - III. Include diagrams for power, signal, and control wiring.
 - iii. Samples: For each exposed product and for each color and texture specified.
 - c. Closeout Submittals
 - i. Operation and maintenance data.
 - ii. Software and Firmware Operational Documentation:
 - I. Software operating and upgrade manuals.
 - II. Program Software Backup: On USB media and approved online or cloud solution.
 - III. Device address list.
 - IV. Printout of software application and graphic screens.
2. Products

- a. Field Quality Control
 - i. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - ii. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - I. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
 - II. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - III. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - b. Software Service Agreement
 - i. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
 - ii. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - I. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.
3. Execution
- c. Quality Assurance
 - a. Installer Qualifications: An authorized representative who is trained and approved by the manufacturer.
 - d. Demonstration
 - i. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain parking control equipment.

DIVISION 12 – FURNISHINGS

SECTION 12 20 00 – WINDOW TREATMENTS

Section Includes: Manually and motor-operated roller shades, mini-blinds, film.

1. Design Requirements
 - a. Roller shades are the preferred method to control glare at perimeter windows. Decorative/performance film acceptable.
 - i. Roller shades will be manually controlled or integrated with automatic electronic room scene controls.
 - ii. A dark value color for the shade cloth is preferred to enhance view to the outside when shade is closed.
 - iii. Shade material will be woven, non-PVC extruded fiber which meets cradle-to-cradle criteria.
 - iv. 1-3% openness factor is preferred.
 - v. Concealed shade housing is preferred.
 - vi. Specify overage/attic stock of mechanical pieces
 - b. Decorative Film
 - i. Required on all full height, interior glazed panels to prevent bodily injury and damage.
 - ii. Organic patterning preferred.
2. Products
 - a. Mecho Shade
 - b. The Shade Store
 - c. Or pre-approved equal
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 12 30 00 – METAL CASEWORK AND COUNTERTOPS

Section Includes: Manufactured metal casework, Metal laboratory casework, specialty casework, specialty metal countertops.

1. Design Requirements
 - a. Metal Lab casework system types to be considered:
 - i. Fixed floor
 - ii. Frame and core with mobile or cantilevered cabinets
 - iii. Table based with mobile cabinets
 - b. Steel Door construction shall include:
 - i. Two-piece door construction painted before assembly. Structurally sound deadened.
 - ii. 5-knuckle institutional type stainless steel hinge, 2-1/2 inches high.
 - iii. Positive latching mechanism.

- iv. Rubber door bumpers.
 - v. Doors perpendicular to adjacent wall to receive hinges that open to 85 degrees.
 - vi. Soft closers
 - c. Steel Drawer construction shall include:
 - i. Full extension drawer with lock open feature. Self-closing, with extra-heavy duty drawer slides, typical.
 - ii. Interchangeable, interlocking drawer head, sound deadened.
 - iii. One piece drawer body with radiused bottom.
 - iv. Radiused cold rolled steel drawer suspension.
 - v. Nylon tired, stainless steel ball bearing drawer rollers.
 - vi. Soft closers
 - d. Metal casework used in wet areas to be constructed of type 304 Stainless Steel.
 - e. Metal casework finish to be electrostatically applied powder coated chemical and abrasion resistant paint.
 - f. Mobile workstations with mobile cabinets.
 - g. Service distribution in conjunction with case work systems shall be horizontal raceway, service uprights, service carries, or ceiling service panels.
 - h. Casework manufacturer, construction and installation shall be in conformance with and recognized by Scientific Equipment & Furniture Association (SEFA), and meet SEFA 8 performance standards for durability and structural integrity.
 - i. Keying and label holders: Coordinate keying and label holder requirements with SCF.
 - j. Hazardous storage cabinets: See 10 51 13.
 - k. Laboratory Countertops to be 1-inch thick with applied finish on marine grade substrate with 4-inch backsplashes U.N.O. Counter material to be selected based on application.
 - i. High pressure laminate or chemical resistant
 - ii. Epoxy resin
 - iii. Phenolic resin with thru body
 - iv. Stainless steel
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution
 - a. AWI standards are the minimum quality criteria for all custom casework construction.

SECTION 12 40 00 – RUGS AND MATS

Section Includes: Entrance Systems

1. Design Requirements
 - a. Preferred entrance walk-off solution shall be modular walk-off carpet as specified in Division 9. This non-removable product will be used at building entrances to remove remnants of dirt and moisture. Provide at vestibules and on the interior side of the vestibules as allowable by the project/space conditions.
 - b. Provide at all exterior entrances.
 - i. Minimum extension into interior space to comply with current ADA codes and regulations.
 - c. Roll-up entry mats acceptable where walk-off carpet is not feasible.
 - i. Provide one extra mat per entry door as attic stock for maintenance.
 - d. Avoid the use of floor grilles/depressed slab systems due to damage caused by wheeled loads and difficulty in cleaning.
 - e. Light colored walk-off finish not permitted.
 - f. Finish to have a dense, abrasive construction to maximize exterior particulate removal.
 - g. Provide ADA compliant, raised threshold at walk-off finish flooring transition.
2. Execution
 - a. Provide waterproof membrane, extend 4 inches up gypsum partition, to mitigate moisture transmission to partitions and slab.
 - i. Conceal waterproof membrane extension with surface applied wall base as specified in Division 9.
3. 5% attic stock required for both walk-off solutions (installed walk-off carpet and roll-up mat).

SECTION 12 93 00 – EXTERIOR SITE FURNISHINGS

Section includes: Product information for picnic tables, benches, bicycle racks, litter bins, bollards, and dumpster screens.

1. Design Requirements
 - a. Aesthetics
 - b. Safety
2. Products
 - a. Furnishing Suite Option 1
 - i. Picnic Tables
 1. Manufacturer: Landscape Forms
 2. Model: MultipliCITY
 3. Finish: Anodized Aluminum with thermally modified ash
 - ii. Benches
 1. Backed with Arms

- a. Manufacturer: Landscape Forms
 - b. Model: MultipliCITY
 - c. Finish: Anodized Aluminum with thermally modified ash
 - 2. Backless
 - a. Manufacturer: Landscape Forms
 - b. Model: MultipliCITY
 - c. Finish: Anodized Aluminum with thermally modified ash
- iii. Bicycle Racks
 - 1. Individual Unit (2 bicycles)
 - a. Manufacturer: Landscape Forms
 - b. Model: MultipliCITY Litter
 - c. Finish: Anodized aluminum with thermally modified ash
 - 2. Ganged Unit (multiple bikes)
 - a. Manufacturer: Landscape Forms
 - b. Model: Flo
 - c. Finish: Stainless steel
- iv. Litter Bins
 - 1. Standard
 - a. Manufacturer: Landscape Forms
 - b. Model: MultipliCITY
 - c. Finish: Anodized Aluminum
 - 2. Bear proof
 - a. Manufacturer: Bear Saver
 - b. Model: CE Series, ADA Compliant
 - c. Finish: Powdercoat black with zinc-rich primer with weathered redwood slats
- v. Bollards
 - 1. Pedestrian Zone & Traffic Control:
 - a. Manufacturer: Landscape Forms
 - b. Model: Stop
 - c. Finish: Powdercoat Mercury Metallic with Matte Black Post
 - d. Option: LED Light
- vi. Lights
 - 1. Bollard:
 - a. Manufacturer: Landscape Forms
 - b. Model: MultipliCITY Path Light
 - c. Finish: Anodized aluminum

2. Pole:
 - a. Manufacturer: Landscape Forms
 - b. Model: FGP Area Light
 - c. Finish: Powdercoat Mercury Metallic
- b. Furnishing Suite Option 2
 - i. Picnic Tables
 1. Manufacturer: Forms+Surfaces
 2. Model: Trio Table Ensemble
 3. Finish: Powdercoat Aluminum Texture with Cumaru Hardwood
 - ii. Benches
 1. Backed with Arms
 - a. Manufacturer: Forms+Surfaces
 - b. Model: Trio Bench
 - c. Finish: Powdercoat Aluminum Texture with Cumaru Hardwood
 2. Backless
 - a. Manufacturer: Forms+Surfaces
 - b. Model: Trio Bench
 - c. Finish: Powdercoat Aluminum Texture with Cumaru Hardwood
 - iii. Bicycle Racks
 1. Individual Unit (2 bicycles)
 - a. Manufacturer: Forms+Surfaces
 - b. Model: Trio Bike Rack
 - c. Finish: Powdercoat Aluminum Texture
 2. Ganged Unit (multiple bikes)
 - a. Manufacturer: Maglin
 - b. Model: 350 Bike Racks
 - c. Finish: Powdercoat Silver Matte
 - iv. Litter Bins
 1. Standard
 - a. Manufacturer: Forms+Surfaces
 - b. Model: Apex Litter & Recycling Receptacles
 - c. Finish: Anodized Aluminum
 2. Bear proof
 - a. Manufacturer: Bearicuda Bins
 - b. Model: Acadia 55 Gallon, ADA Compliant
 - c. Finish: Powdercoat black
 - v. Bollards
 1. Pedestrian Zone & Traffic Control (if embedded):

- a. Manufacturer: Custom Fabrication
 - b. Fabrication: 36" height 6"x6"x1/4" HSS with 7"x7"x3/16" plate steel cap, with 5"x32"x3/4" wood panels all four sides attached with #14x20x1.5" SS tamper-proof countersunk machine screws set 2" from each end, centered in width of panel. Provide bolt plate or extend length of post for embedded installation.
 - c. Finish: Powdercoat Black Matte with Dark Red Mahogany Panels
 - d. Option: LED Light
- vi. Lights
- 1. Bollard:
 - a. Manufacturer: Forms+Surfaces
 - b. Model: Vao Bollard
 - c. Finish: Satin With Ceramiloc Treatment
 - 2. Pole:
 - a. Manufacturer: Forms+Surfaces
 - b. Model: Vao Pedestrian Lighting
 - c. Finish: Satin With Ceramiloc Treatment
- c. Bollards – Utility or Structure Protection
- i. Determine the level of vehicle impact protection needed and provide a bollard and footing structural design to meet or exceed requirements.
 - ii. If an aesthetic bollard is desired, use the bollard type for Pedestrian Zone & Traffic Control if that type meets protection needs. If the required impact resistance exceeds that of the bollard type for Pedestrian Zone & Traffic Control, provide options for alternative aesthetic bollards for the client to review and select.
 - iii. If the bollard is preferred to be solely functional, provide options for the client to review and select. Schedule 80 or thicker steel pipe with a welded cap is preferable to concrete-filled steel pipe (if possible within structural needs).
 - iv. Coordinate bollard design and placement with pavement heating systems (if present), including minimizing or eliminating the potential for system damage due to bollard movement from impact.
 - v. Finish: Powdercoat Black Matte or Silver Matte
- d. Site Structures
- i. Dumpster Screen:
 - 1. Be of similar design and materials to match adjacent building or design elements.

2. Have size verified with desired use and scheduled maintenance

DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 13 34 19 – METAL BUILDING SYSTEMS

Section Includes: Systems consisting of structural framing, and standard components.

1. Design Requirements

a. Submittals

- i. Product Data: For each type of metal building system component.
- ii. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and attachments to other work.
- iii. Drawings and calculations, signed and stamped by a Civil or Structural engineer licensed in the State of Alaska.

b. Quality Assurance

- i. Manufacturer Qualifications: A qualified manufacturer.
 - I. Accreditation: Manufacturer's facility accredited according to IAS AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
 - II. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- ii. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

2. Products

a. Performance Requirements

- i. Structural Performance: Design the metal building systems to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to the procedures in MBMA's "Metal Building Systems Manual."
 - I. Design Loads: As indicated.
 - II. Deflection and Drift Limits:
 - a) Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."

- ii. Seismic Performance: Metal building system to withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- iii. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- iv. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E119 or ASTM E108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - I. Indicate design designations from UL's "Fire Resistance Directory," FM Global's "Approval Guide," or from the listings of another qualified testing agency.
- v. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - I. Wind Loads: As indicated on Drawings.
- vi. Energy Star Listing: Roof panels that are listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for steep-slope roof products.
- vii. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 - I. Three-year, aged, solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
 - II. Three-year, aged, Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.
- viii. Thermal Performance for Opaque Elements: Provide the following maximum U-factors and minimum R-values when tested according to ASTM C1363 or ASTM C518:
 - I. Roof:
 - a) U-Factor: .03.
 - b) R-Value: 40.
 - II. Walls:
 - a) U-Factor: .04.

b) R-Value: 24.

b. Structural-Steel Framing

- i. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings." and AISC 341, "Seismic Provisions for Structural Steel Buildings".
- ii. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- iii. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

c. Personnel Doors and Frames

- i. Swinging Personnel Doors and Frames: Metal building system manufacturer's standard doors and frames; prepared and reinforced at strike and at hinges to receive factory- and field-applied hardware according to BHMA A156 Series.

d. Accessories

- i. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
 - I. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- ii. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
- iii. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
- iv. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.

e. Fabrication

- i. General: Design components and field connections required for erection to permit easy assembly.
 - I. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 - II. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members to be free of cracks, tears, and ruptures.
- ii. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- iii. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
- iv. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
- v. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
 - I. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

f. Source Quality Control

- i. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.

3. Execution

a. Erection Of Structural Framing

- i. Erect metal building system according to manufacturer's written instructions and drawings.

- ii. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
 - iii. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- b. Field Quality Control
- i. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.

SECTION 13 48 00 – VIBRATION AND SEISMIC CONTROL

Section Includes: Vibration and seismic design requirements for non-structural components and equipment.

1. Design Requirements

- a. This section specifies performance requirements for the design, provision, supervision, and administration of all aspects of vibration isolation and seismic control of non-structural elements.
- b. It is the design intent to anchor, brace, and support the facility's non-structural elements, including pre-engineered equipment, to the building's structure, including but not limited to:
 - i. Mechanical and electrical equipment
 - ii. Pipe and ductwork systems
 - iii. Electrical raceways
 - iv. Tanks and vessels
 - v. Roof or pad on grade mounted equipment
 - vi. Exterior and interior equipment, cladding, and other non-structural elements
 - vii. Racks and cabinets.
 - viii. The bracing and support of critical equipment, closed systems containing hazardous materials, or systems which if damaged pose a health hazard, should be given additional consideration.
- c. The design of seismic bracing for all non-structural elements must meet or exceed the requirements of the locally adopted building code.
 - i. If a local jurisdiction does not have an adopted building code, conform to the latest edition of the International Building Code and associated standards.

- d. The project design documents should contain all information necessary to design the non-structural component support and bracing.
 - i. Identify on construction drawings any high hazard systems, critical equipment, or any other non-structural component that requires an importance factor (I_p) of 1.5.
 - ii. Building seismic joints and systems required to accommodate differential seismic motion are to be identified in the construction documents.
- e. Coordinate the non-structural element attachment techniques and design loads with the structural engineer of record.
- f. Equipment sensitive to vibrations, including CT machines, MRI machines, microscopes, etc.
 - i. Consider locating vibration sensitive equipment on the ground floor level where it can be supported at grade.
 - ii. Additional design consideration should be performed to ensure equipment will function properly at the intended locations. Design considerations include:
 - I. Effects of vibration on the equipment from the structure, occupant walking traffic, and mechanical or electrical equipment.
 - II. Magnetic or radiation interference.
 - III. Access for replacement or repair of the equipment.
- g. Rooms with occupancies sensitive to vibrations
 - i. Additional design consideration should be given to locating rooms with sensitive occupancies away from sources of vibration.

2. Products

- a. Provide construction documents and supporting information necessary to properly implement the seismic and vibration control plan, including:
 - i. Construction drawings, including plans and details as necessary.
 - ii. All special inspections required by the adopted building code
 - iii. Calculations documenting the adequacy of the seismic and vibration control plans.
- b. Provide a Vibration and Seismic Control specification for each project that is fully coordinated with all other disciplines.
- c. The design of non-structural bracing and vibration control may be accomplished by the consultant or through performance specifications and deferred submittals.

- i. Where deferred submittals for seismic and vibration control are utilized, the submittals should be reviewed by the consultant or the owner's authorized representative.
 - ii. Identify the deferred submittals in the design drawings.
 3. Execution
 - a. Perform all required special inspections and provide the necessary documentation for review by the owner or owner's authorized representative.

SECTION 13 49 00 – RADIATION PROTECTION

Section Includes: Lead sheet, strip, and plate, Lead-lined gypsum board, Lead-lined softwood plywood, Lead glass, Lead-lined hollow-metal doors, Lead-lined hollow-metal frames, Lead-lined flush wood doors, Informational signs.

1. Design Requirements (no specific guidance given- below is best practice)
 - a. Refer to NCRP Report No. 147 for general guidance.
 - b. Definitions
 - i. Lead Equivalence: The thickness of lead that provides the same attenuation (reduction of radiation passing through) as the material in question under the specified conditions.
 - I. Lead equivalence specified for materials used in diagnostic x-ray rooms is as measured at 100 kV unless otherwise indicated.
 - c. Preinstallation Meetings
 - ii. Preinstallation Conference: Conduct conference at Project site.
 - d. Action Submittals
 - i. Product Data: For each type of product.
 - I. Doors and Frames: Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.
 - ii. Shop Drawings: Show layout of radiation-protected areas, indicating lead thickness or lead equivalence of components. Show components and installation conditions not fully dimensioned or detailed in product data.
 - I. Show ducts, pipes, conduit, and other objects that penetrate radiation protection; include details of penetrations.
 - II. Show details of joints between radiation protection materials.
 - III. Show details of securing lead bricks to structure.
 - IV. Include door details, including elevations, frame dimensions and profile, glazed light, louver cutouts, and clearances and undercuts.

2. Products

a. Performance Requirements

- i. Provide materials and workmanship, including joints and fasteners, that maintain continuity of radiation protection at all points and in all directions equivalent to materials specified in thicknesses and locations indicated.
- ii. Materials, thicknesses, and configurations of radiation protection products indicated are based on radiation protection design prepared by architect's radiation health physicist consultant.
- iii. Lead-Lined Assemblies: Unless otherwise indicated, provide lead thickness in lead-lined assemblies of not less than lead thickness indicated for assemblies in which they are installed.
- iv. Lead Glazing: Unless otherwise indicated, provide lead equivalence of not less than that indicated for assembly in which glazing is installed.
- v. Fire-Rated and Smoke-Control Door and Frame Assemblies: Comply with Section 081113 "Hollow Metal Doors and Frames" and Section 081416 "Flush Wood Doors."

b. Informational Signs

- i. Color: As selected by Architect from manufacturer's full range of colors.
- ii. Indicate lead equivalence in millimeters and heights of radiation protection in inches.
- iii. Rooms Where the Level of Protection Is Uniform Throughout: Provide one sign for each room indicating lead equivalence of partitions, ceilings, floors, doors, and other portions of radiation protection enclosure. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height.
- iv. Rooms Where the Level of Protection Is Not Uniform Throughout: Provide one sign for each room with different lead equivalences in different locations. Indicate, in tabular form, lead equivalence of each wall, partition, ceiling, floor, door, and window. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height. Indicate where lead equivalence changes or is not continuous.
- v. Rooms Where Some Partitions Are without Radiation Protection: Provide one sign for each partition that contains radiation protection and indicate its lead equivalence. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height.
- vi. Rooms Where Only the Door Has Radiation Protection: Provide one sign for each door indicating its lead equivalence.

3. Execution

a. Installation Of Lead Sheets in Concrete Floor Slabs

- i. Proceed with installation only after concrete surfaces are clean, dry, and free of depressions and sharp projections that could damage or penetrate lead sheet.
- ii. Coat concrete surfaces with asphalt emulsion before installing lead sheet.
- iii. Lead Sheet, 1/8 Inch (3.18 mm) Thick or Less: Install in a single layer with a 2-inch (50-mm) minimum lap at joints.
- iv. Extend lead sheet at least 12 inches (300 mm) beyond radiation shielding in walls of treatment room.
- v. In floor slabs above shielded rooms, where lead sheet is indicated, extend lead sheet at least 12 inches (300 mm) beyond radiation shielding in walls of room below.
- vi. At door openings, extend lead sheet at least 12 inches (300 mm) beyond radiation protection in walls and at least 12 inches (300 mm) beyond door opening on both sides, except where lead-lined thresholds are provided].
- vii. After installation, apply two coats of asphalt emulsion on top surface of lead sheet and protect from damage until concrete topping is placed.

b. Field Quality Control

- i. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections after radiology equipment has been installed and placed in operating condition.
- ii. Correct deficiencies in or remove and replace radiation protection that inspection reports indicate does not comply with specified requirements.

DIVISION 14 – CONVEYING EQUIPMENT

SECTION 14 20 00 – ELEVATORS (COMBINED)

Section Includes: Electric Traction Elevators, Electric Traction Freight Elevators, Machine Room-Less Electric Traction Passenger Elevators, Hydraulic Elevators, Hydraulic Freight Elevators, Limited-Use/Limited-Application Elevators.

1. Design Requirements

- a. Elevator manufacturer to provide equipment and installation warranty and maintenance services for at least one year after acceptance. This requires routine monthly inspection, emergency calls and all parts and labor required to maintain elevator in first class condition. SCF maintenance specifications are available from Project Manager.
- b. Use of existing and new elevators during construction:
 - i. Designer and Project Manager will ensure that contract language defines liability for SCF or Contractor caused operational deficiencies during the construction phase. Include provisions for protection and repair of existing cab, frame and door surfaces. Include consequences for repair of damages.
 - ii. Specify load carrying limits and consequences for exceeding those limits. All SCF freight elevators are classified as Class A-General Freight Loading. This classification limits any single piece of freight to a maximum of 25 percent of the rated load of the elevator. Pallet jacks, both manual and powered, are not permitted to be used to load/unload any elevator. If there is a need to move loads exceeding this limit, contact SCF Facilities Services Labor Shop to coordinate. Tests may be performed before and after construction to establish undue wear and tear during construction.
- c. Standard SCF elevator features include:
 - i. Closed loop door operators.
 - ii. All parts and equipment shall be non-proprietary or be readily serviceable and available by third-party vendors. Special equipment or tools necessary for the repair, adjusting, or troubleshooting of the operation of any related equipment shall be included in the project. Provide diagnostic tools that are not self-destructing or self-resetting and will become the property of the owner.
 - iii. Electronic scanning type door protection.
 - iv. Independent service.
 - v. Emergency battery lowering unit on hydraulic elevators.
 - vi. Tamper-proof door interlock.

- vii. Minimum 15% spare conductors in traveling cable. Traveling cables will include communications wiring (coax, twisted pair, Ethernet).
 - viii. SCF elevator number engraved on car operating panel.
 - ix. Run/Stop key.
 - x. Floor lockout switch keyed to SCF master for access to restricted areas.
 - xi. Provide work tool and software for proprietary controllers. Provide (1) set of spare controller boards for any boards that are not readily available from third-party vendors. Submittals will include an itemized list of spare components to be provided.
 - xii. New or replacement sills will be nickel-silver alloy for all elevators with a capacity of 2500 pounds or more.
 - xiii. Provide large machine numbers on drives, controllers and disconnects.
 - xiv. Provide cab pads and vandal resistant hangars for all elevators.
 - xv. Provide flush mounted, vandal resistant buttons and bezels.
 - xvi. Maximum Machine Roomless (MRL) elevator roping will be 2:1.
 - xvii. Beam will be installed in the overhead of all elevator hoistways that is capable of supporting the weight of the fully loaded car.
- d. Multi-stage telescoping twin-post equipment will not be installed at SCF.
- e. Designers will include in their design documents the following items:
- i. All work depicted in elevator space drawings will include sheet notes requiring that:
 - I. Subcontractors coordinate all electrical, mechanical and plumbing installations with elevator contractor.
 - II. All hoistway penetrations are fireproof sealed.
 - III. Remove unused devices/connectors on hoistway surfaces.
 - IV. Bevel all hoistway horizontal surfaces not on the loading/unloading side exceed 4 inches to an angle not less than 75 degrees from horizontal. Elevator support framework is not included in this requirement.
 - V. No equipment will be installed in elevator car, hoist way or machine room that is not directly related to the elevator operation.
 - VI. Coordination of pit ladder size and installation location will be coordinated with the elevator manufacturer.
 - VII. See ASME A17.1, Sec. 2.8 for restrictions on installation of equipment in hoistways and machine rooms. Examples:

wiring/raceways/cables, steam and water piping, risers, return piping, traps, valves, ducts, sprinklers and alarms.

- a. Provide two phone lines and one Ethernet cable to controller in elevator machine room to accommodate cab phone and future remote monitoring by elevator maintenance contractor. One of the phone lines will be a two-way "800" line for remote monitoring by the elevator contractor.
- b. Inspector will not issue certificate of operation if cab phone is not connected to emergency responder. Contract managers need to identify the destination for the phone and coordinate the connection and programming before inspection.
- c. Review provisions of NEC Art. 620 for compliance with elevator work.
 - i. GFCI receptacles in elevator pit and machine room. If pit sump pump is installed, provide separate simplex (bulls-eye), non-GFCI receptacle for sump pump.
 - ii. Elevator pit light switch location is subject to hoistway door operation and pit ladder location. Electrical to coordinate with elevator contractor.
 - iii. ASME A17.1 requires minimum pit illumination of 10 foot-candles at pit floor. Use LED light fixtures mounted horizontally on pit wall.
 - iv. ASME A17.1 requires NEMA 4 fixtures and wet location wiring on all electrical equipment mounted less than 48 inches AFF in hoistways with sprinklers.
 - v. All machine room disconnects (power, lighting, pit equipment) require labeling that provides location of panel, panel number and breaker number.
 - vi. Car light disconnecting switch/breaker will be capable of being locked in the open position. Consequently the upstream overcurrent protection should not be located in the machine room. See NEC 620.53 for car light disconnecting means.
- d. Comply with applicable Fire Protection codes and standards:
 - i. Sprinklers are required in all machine rooms and within 24 inches of pit floor on hydraulic (roped-hydro) installations using combustible hydraulic fluid.
 - ii. Sprinklers are not required in hoistway overhead of new elevators.
 - iii. Smoke detectors are required in all elevator lobbies, elevator machine rooms and elevator hoistway overheads.
 - iv. Heat detectors required in elevator machine rooms (adjacent to the sprinkler head) with lower release temperature than

- sprinkler head. Similarly, heat detector is required in hoistway overhead only if sprinkler head is installed.
- v. Upon activation of machinery space heat detector, elevator shunt trip activation will have a programmed delay based on the AHJ policy at the time of acceptance.
- e. Pit sump and automatic pump required if Firefighter Service is installed, pit is subject to groundwater intrusion or if sprinkler is installed. Sump pumps will be indirectly connected to the plumbing system per IBC. SCF prefers that a dedicated discharge receptacle be provided. The receptacle will be furnished with a grated cover to prevent deposition of foreign materials that can clog the drain.
- i. Elevator code and plumbing code do not direct the discharge but local water utility will not be receptive to the possibility of oily discharge. Hydraulic elevators require a hydrocarbon switch on sump pump that opens pump motor circuit when it detects oily products.
 - ii. All pits with a sump will have a high water level alarm installed to notify maintenance personnel of pump activation.
 - iii. Install drain tee and ball valve in pit to allow drainage of pump discharge line after testing or any operation. Location of drain tee and accessories will be coordinated with elevator contractor to guarantee clearances.
 - iv. Install sump grate that is flush with pit floor and supports a minimum of 300 pounds.
 - v. Specify cast bronze pumps unless otherwise approved.
 - vi. Sumps, sump pumps and discharge receptacles will be capable of accommodating diversified discharge loads of at least 50 gallons per minute (gpm) per elevator.
- NOTE: Dual elevators in a shared hoistway will require accommodation of at least 100 gpm discharge rate.
- f. If required by IBC or the AHJ, hoistway vents will use low-temperature, low-leakage dampers and be controlled. Provide for a freeze stat alarm under Division 23 in the pit to alert FS Maintenance of possible freezing conditions.
 - g. Pit ladder will be provided by General Contractor. See ASME A17.1 for specific requirements. Ladder must comply with OSHA standards.
 - h. Hoistway and machine room shall have all holes and penetrations fire caulked to meet fire rating of hoistway to include the top of the hoistway, where the ceiling meets the walls.
 - i. If structure must be rated, cementitious mono-coating or intumescent paint must be used. Sprayed-on fiber insulation shall not be applied to any surface

of the hoistway to achieve the required fire rating of the hoistway. The intent is to ensure the hoistway is not contaminated.

- j. Entrance to machine room shall be located off a public corridor or through a mechanical equipment room. Entrance shall not be through an office, classroom, or restroom.
- k. 10 lb ABC type fire extinguisher will be located and mounted in machine room by the door.
- l. Install switched lighting and GFCI outlet in hoistway overhead for any hoistway that has a machine-room-less (MRL) elevator installed.
- m. Coordinate with SCF for access control requirements.

2. Products

a. Controllers:

- i. Major manufacturers: Otis, ThyssenKrupp, and Schindler
- ii. Independents: Virginia Controls, ERM, Minnesota Elevator, GAL GALaxy.
- iii. All subject to approval by UAF.

b. Door operators:

- i. ThyssenKrupp Elevator
- ii. Otis.
- iii. G. A. L.
- iv. No alternate brand requests, No substitutions allowed

c. Elevator Cars and Operating Systems:

- i. Hydraulic
- ii. Traction

d. Acceptable manufacturers of major Machine-Room-Less equipment:

- i. Otis
- ii. ThyssenKrupp
- iii. Schindler

3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 20 – MECHANICAL SUPPORT

Division Includes: Topics and issues common to multiple aspects of Mechanical work.

SECTION 20 00 00 – MECHANICAL GENERAL REQUIREMENTS

Section Includes: Design Requirements that apply to broad topics or multiple discipline coordination.

1. Design Requirements

a. General:

- i. Incorporate the following in the design of the mechanical systems:
 - I. Energy efficiency
 - II. Accessibility of equipment and ease of maintenance
 - III. Consideration for future growth or space configuration modifications
- ii. Encourage the inclusion and participation of SCF Facilities Maintenance and Operations staff in the system design and commissioning process.
- iii. Basis of Design (BoD):
 - I. Develop BoD document that includes detailed information on the design team's approach to meet Owner Project Requirements (OPR). Refer to Informative Appendix to ASHRAE Standard 202 - Commissioning Process for Buildings and Systems for an example of BoD contents and edit as applicable to the specific project. Update and expand BoD during design and construction as the project evolves. Initial BoD and all subsequent changes shall be reviewed and accepted by SCF PM, Facilities Representative, and Commissioning Agent.
- iv. Maintenance: access to equipment is of the utmost importance.
 - I. Provide maintenance platforms for equipment not easily maintainable from the floor or from a step ladder.
 - II. Provide maintenance vestibules or preferably penthouse enclosures for all roof-mounted equipment.
 - III. Provide access to above-ceiling equipment to include clearance for adjustments, maintenance, and replacement.
 - IV. Install above-ceiling equipment within 24 inches of ceiling access unless specifically reviewed and approved by Facilities.

- V. Coordinate access pathways to VAV control boxes and similar, especially above ceilings.

- b. Equipment Rooms

- i. Require dedicated storage room, 10 foot x 10 foot minimum, for spare parts and "attic stock" for every project beginning at the Programming stage.
- ii. If onsite facility staffing is expected, require a dedicated facility maintenance office, 10 foot x 10 foot minimum, beginning at Programming stage. Office may be located adjacent to or within a mechanical room.
- iii. Enclosed and conditioned rooftop penthouses are preferred over exposed rooftop equipment, as budget allows. Elevator access to penthouses is encouraged.
- iv. Locate mechanical equipment rooms, especially boilers and pumps, on the ground floor with double doors to the exterior and at least one interior door.
- v. FM Global 6-4
 - I. Prohibits boiler rooms below grade
 - II. Recommends against routing metal stacks through combustibles walls, floors, or ceilings
 - III. Requires 30-inch clearance between metal stacks and stored materials
- vi. Sizing of equipment rooms:
 - I. Provide minimum 24 inches access to all sides of equipment (not just service sides) and provide clearance requirements for moving replacement equipment in and out of the space.
 - II. Provide space for storage of maintenance and service tools, size to be coordinated at Programming.
 - III. Provide storage space for at least two drums (15 ft²) of glycol fluid.
 - IV. Height: confirm clearance requirements during programming. Mezzanine spaces will be considered on case-by-case basis.
- vii. Provide concrete housekeeping pads for all floor-mounted mechanical equipment. Size pads at least 3-1/2 inches thick and 6 inches wider than equipment mounts in each direction.
- viii. Provide floor drains in all Mechanical equipment rooms and slope the entire extent of the floor area to drain.

- ix. Design spill containment for the perimeter of boiler rooms and other mechanical spaces with fuel-oil-containing equipment.
 - x. Provide water- and impact-resistant covering on walls of equipment rooms.
- c. Restrooms
- i. Floor drains are preferred in every restroom. The entire restroom floor must slope to floor drain.
- d. Acoustics
- i. Thoroughly review Noise Control as measured by decibel reduction through partitions and floors during the design. Intrusion of noise from outside the affected space can reduce privacy, concentration, and productivity. Minimum acoustical requirements, sound isolation, and vibration controls are required to mitigate high levels of background noise generated by HVAC equipment, poor room acoustics, adjacent activities, and so on. Pay special attention to upper floors under roof mounted equipment.
 - ii. Control of sound transmission between rooms is required between sensitive areas such as exam rooms, talking rooms, private offices, and conference rooms. Develop Sound Transmission Class (STC) minimum rating criteria for each expected adjacency in the facility. Refer to FGI Guidelines such as 2018 FGI Table 1.2-6 Design Criteria for Minimum Sound Isolation Performance Between Enclosed Rooms. Consider Speech Privacy Class (SPC) when establishing target STC ratings. In sensitive areas consider using full-height walls where practicable, and/or the ceilings shall have the following ratings:
 - I. NRC (noise reduction coefficient) – 0.75
 - II. CAC (sound blocking) – 35
 - III. AC (articulation class) – 170
 - iii. Avoid acoustic control systems using clips

- iv. Utilize current FGI and ASHRAE design guidelines for HVAC and plumbing related background sound levels. Generally, provide the following (taken from 2018 FGI Table 1.2-5):

Room Type	Max NC/RC(N)/RNC
Multi-occupant patient care area	40
Exam/Treatment/Procedure Room	40
Medication Safety Zone	40
Testing/Research Lab, Minimal Speech	55
Research Lab, Extensive Speech	50
Corridors and public areas	45
Conference Room	35
Private Enclosed Office	40
Open-Plan Offices	50

- e. As-Built and Record Drawings:

- i. Annotate below-grade piping routing and inverts on record drawings.
- ii. Annotate locations of all main drains, isolation valves, and high point air vents on the record documents.

- f. Heating and Cooling Load Calculations

- i. Utilize and document the following conditions for calculation of the heating and cooling loads for each building:
 - I. Outdoor Conditions based on the nearest appropriate ASHRAE weather station:
 - a) Outdoor Heating Design Temperature: 99.6% Heating Dry Bulb Temperature.
 - b) Outdoor Cooling Design Condition: 0.4% Cooling Dry Bulb Temperature and Mean coincident wet bulb.
 - c) Outdoor Humidification Design Condition: 99% Heating Dew Point Temperature, Humidity Ratio, and Mean coincident dry bulb temperature.
 - d) Outdoor Dehumidification Design Condition: 1% Cooling Dew Point Temperature, Humidity Ratios and Mean coincident dry bulb temperature.

- II. Indoor Design Condition (default; specific needs may have other requirements):
 - a) Based on ASHRAE Standard 55 - Thermal Environmental Conditions for Human Occupancy
 - b) Heating: 70 +/- 2°F indoor design temperature.
 - c) Cooling: 74 +/- 2°F indoor design temperature.
- ii. Zoning:
 - I. Provide maximum 15-foot-deep exterior zones around the perimeter of the building, and interior zones for the remainder of the building.
 - II. Divide exterior spaces into zones with no more than 3 spaces unless approved by SCF.
 - III. Provide separate zone for corner rooms with two different exposures.
 - IV. Provide separate zones for meeting and conference rooms.
 - V. Provide the maximum level of temperature control zoning afforded by the project budget. Generally, each exam room and each talking or conference room should be zoned separately; each corner office should be zoned separately, and preferably a maximum of two offices of similar size, exposure and occupancy should share a temperature zone.
 - VI. Provide a zone map showing thermostat locations for review and approval.
- iii. Infiltration:
 - I. Base infiltration rate on the maximum allowed by AHRAE 90.1 for the building type, unless otherwise approved by SCF. Document intent for lower-than-code-allowed infiltration rates in BoD along with the method outlining how the infiltration rate will be verified upon the completion of the construction.
- g. Ventilation Systems
 - i. Design ventilation systems to meet the requirements of the latest adopted version of ASHRAE Standards 62.1 and 90.1 and FGI/ASHRAE 170.
 - ii. Utilize occupancy sensors where practical to reduce ventilation rates of unoccupied spaces.
 - iii. Provide demand-controlled ventilation strategies for high occupancy spaces such as large classrooms and conference rooms.

- iv. Provide full direct BAS control of air handling units (AHUs) instead of manufacturer's packaged controllers.
- v. Provide minimum filtration of supply air in AHUs to include: MERV 8 pre-filters in front of MERV 14 final filters. Consider additional filtration such as PM10 or PM2.5 dust filters, HEPA, or odor-control carbon on case-by-case basis.
- vi. Provide a manual filter change On/Off switch for each AHU to facilitate filter change out by Maintenance staff. Wire the switch directly to the supply fan VFD. Install the switch on a wall as close to the filter section as practical. Label the switch with a permanent placard.
- vii. Provide outside air intake louvers sized for a maximum free area velocity of 400 fpm to minimize entrainment of rain and snow. Slope intake plenums to drain to the exterior. Specify watertight construction.
- viii. Humidification systems are not required nor desired for administrative offices. Humidification systems may be required to maintain required humidity levels in spaces governed by FGI/ASHRAE 170 such as acute care, operating rooms, etc. and should be considered on a project-by-project basis.
- ix. Heat Recovery (airside):
 - I. If Heat Recovery Ventilation (HRV) is required for rural projects, provide robust, durable, proven HRV units with simple controls. HRVs are subject to harsh operating conditions and are a single point of failure.

h. Heating Systems

- i. Design heating systems to meet the requirements of the latest adopted version of ASHRAE Standards 90.1.
- ii. Heating Plants:
 - I. SCF prefers to heat with hydronic, low temperature water; except for fuel oil systems.
 - II. On projects where existing heating water distribution system and heating water coils will remain, confirm supply and return water temperature requirements will be met.
 - III. Provide building heating plants comprised of multiple boilers for redundancy.

- IV. Provide a minimum combined boiler output at 120% of the calculated design heating load (excluding "safety factor" if present).
 - V. Provide boiler number and sizing and piping arrangement that allows one boiler to be out of service with sufficient remaining capacity to protect the building from damage.
 - VI. Provide multiple heating water pumps piped in parallel to eliminate a single point of system failure due to loss of pump.
- iii. Hydronic Fluid and Makeup:
- I. Water with corrosion inhibitors is the preferred hydronic fluid. Provide a water meter with 1-1/4-inch system fill bypass on the system makeup water connection.
 - II. Provide Secondary 50% propylene glycol/water systems separated from Primary heating system by heat exchangers for heating terminal devices (coils, snowmelt etc.) that are regularly exposed to outside air and are at risk of damage due to freezing.
 - a) Automatic makeup is preferred for indoor systems. Include standalone manual makeup pump station as backup.
 - b) Provide manual make-up for snowmelt glycol systems. Automatic glycol makeup systems are not acceptable.
 - III. Provide Air elimination systems (not air control systems) on all new hydronic heating systems. Do not mix the two types of air management systems.
- iv. Snowmelt Systems:
- I. De-couple snowmelt systems from main heating systems with water-glycol heat exchangers.
 - II. Coordinate locations of manifolds and maintainable equipment with SCF. Preference is to locate within the building envelope.
 - III. Default preferred snowmelt slab design parameters:
 - a) 4-inch minimum concrete thickness
 - b) Tubing placed nominally 2 to 4 inches below top of slab, not at the bottom of the slab.
 - i. For rapid-response applications, place tubing nominally 2 inches below top of slab
 - c) Place tubing above re-bar if present

- d) Provide 2-inch rigid insulation placed below slab
 - i. Include edge insulation coordinated with meltwater management design
- e) Provide meltwater management
- v. Pumps:
 - I. Provide redundant lead/standby pumps for building hydronic heating circulation.
 - II. Provide a separate variable speed drive (VSD) for each pump.
 - III. For larger systems consider parallel pumping lead/lag arrangement where a single pump can satisfy at least 60% of the load.
- vi. Valves:
 - I. Provide floor level isolation valves at a minimum.
 - II. Provide for drain down of the system by floor level at a minimum.
 - III. Utilize ball or gate valves for equipment and zone isolation valves. Butterfly valves used for this purpose are not acceptable.
- vii. Route hydronic piping away from Electrical and Telecom Rooms.
- viii. Coordinate standby power requirements for equipment required for building freeze protection.
- i. Cooling Systems
 - i. Design cooling systems to meet the requirements of the latest adopted version of ASHRAE Standards 90.1.
 - ii. Refrigerant-based cooling coils and air-cooled condensing units are preferred. Avoid hydronic cooling systems and chillers.
 - iii. Provide dedicated cooling systems for constant loads such as server rooms. Consider ways to recover rejected heat for beneficial use.
- j. Plumbing Systems
 - i. For building renovation or renewal projects, before reuse of concealed or below grade piping, perform a condition survey via camera inspection.
 - ii. Coordinate all planned natural gas work with Enstar, or the local gas provider.
 - iii. Include capacity for water supply requirements for the building irrigation system, if planned. Coordinate with Landscape consultant.

- Provide Code required backflow protection for irrigation system interior to the building.
- iv. Provide below grade piping inverts on construction drawings.
 - v. Standard slope for storm drain and sanitary waste piping is $\frac{1}{4}$ inch per linear foot.
 - vi. Standard height of plumbing vents is 18 inches above adjacent roofing surface.
 - vii. Review FM Global rain leader sizing and design requirements (1-54) with SCF to determine applicability:
 - I. Size secondary roof drainage using 2X the 100-year 60-min rainfall intensity
 - II. Provide one primary roof drain per 10,000 SF, but at least two primary roof drains for < 10,000 SF
 - III. Use drain outlet and piping sizes 4 to 10 inches only
 - IV. Provide secondary drainage system entirely separate from primary drainage system.
 - viii. Provide adequate provision for rain leader heat trace segment replacement.
 - ix. Fixture requirements:
 - I. Provide an integrated water bottle filling station with drinking fountains.
 - II. Provide exterior freeze proof hose bibs. Coordinate locations and spacing with Architect and Landscape consultant.
 - III. Provide floor drains in all mechanical/utility rooms, restrooms, shower rooms, drying areas, laundry rooms, and laboratories. Slope floors uniformly from the wall to the drains.
 - x. Install trap primers on all floor drains.
 - xi. Provide diaphragm or piston style water hammer arrestors at hot & cold service to all fixtures. Pipe riser tubes not allowed. Single water hammer arrestor may serve banks of fixtures.
 - xii. SCF prefers direct-fired water heaters for domestic hot water generation.
 - xiii. Utilize ball or gate valves for equipment isolation valves. Butterfly valves used for this purpose are not acceptable.
 - xiv. No plumbing piping is to be routed through Electrical or Telecom Rooms or other high-value spaces such as x-ray. When this cannot

be avoided, provide drip trays under pipes AND readily accessible and labeled shutoff valves serving the area of concern.

- xv. Avoid use of sewage lift stations, unless absolutely necessary. Where required, consult with SCF to avoid known issues.
- xvi. Establish whether connection to an AWWU or SCF owned water line is planned. If the water line is SCF owned, the water meter must be provided by the Contractor.
- xvii. Reverse Osmosis Systems:
 - I. Scale the system design and complexity appropriate for the application:
 - a) Dental clinics and similar large users of RO water can support a centralized, piped RO system
 - b) Smaller users such as Pharmacies should be provided with point-of-use RO systems
 - c) Rural and remote locations are best served by distilled water shipped to the facility
- xviii. Provide the following equipment, in the indicated sequence, at each main water service to each building:
 - I. Main isolation valve
 - II. Tee to sprinkler system double check backflow preventer (minimum 1 union or flanged connection). Where sprinkler system entrance is separate from domestic water entrance, instead provide backflow on sprinkler system entrance and provide a separate prior isolation valve.
 - III. Building reduced pressure backflow preventer.
 - IV. Strainer with manual blowdown and stainless steel screen.
 - V. Tee for upstream connection of pressure reducing valve (PRDV) and water meter bypass
 - a) Bypass shall be line size and include pressure gauges upstream and downstream of bypass isolation valve.
 - b) Pressure gauges shall be isolated by gauge isolation valves.
 - VI. Isolation valve(s)
 - VII. Pressure Reducing Valve – (PRDV)
 - VIII. Water meter with union connections.

- a) If not utility provided, Owner will furnish for contractor to install a 2-inch Badger Recordall compound series meter.
 - b) Coordinate with Division 26 for installation of conduit and wiring.
 - c) Indicate as such on drawings.
- IX. Isolation valve
 - X. Tee for downstream connection of PRDV and water meter bypass.
2. Products
- a. Avoid one-off hard to source products
 - b. Specify spare parts or components be provided when lead time for these items is lengthy or the function of the equipment is critical.
 - c. Specify variable speed drives (VSD) where practical for energy conservation and system control. Two speed motors are not acceptable.
3. Execution
- a. Provide isolation valves in heating, cooling, and plumbing piping at the following locations at a minimum:
 - i. Equipment needing service or replacement
 - ii. Each restroom group
 - iii. Each floor level
 - iv. Each wing or area of building

SECTION 20 05 53 – MECHANICAL IDENTIFICATION

Section Includes: Labels and Tags.

1. Design Requirements
- a. Obtain equipment numbers from SCF before Design Development.
 - b. Use industry standard nomenclature and acronyms.
 - c. Provide a full list in specifications.
2. Products
- a. Valves: tags to be 1-1/2-inch diameter minimum, brass construction with beaded chain fastener.
 - b. Piping: Pipe markers to be flexible vinyl with pressure sensitive adhesive backing.
 - c. Equipment: Provide engraved plastic equipment tags with 3/4-inch minimum letter height, contrasting colors. Provide minimum tag thickness of 1/16-inch.

3. Execution

- a. Valves: Provide a master valve tag directory in the IOM submittal at project completion.
- b. Piping:
 - i. Provide piping identification labels and flow direction arrows.
 - ii. Install pipe labels at maximum 20-foot intervals along straight piping runs (including risers and drops), adjacent to each valve and tee, at each side of a "blind" penetration or obstruction.
- c. Equipment:
 - i. Secure tag to equipment via mechanical methods. Adhesive-only fastening is not acceptable.
 - ii. Provide a master equipment directory in the IOM submittal at project completion.
 - iii. For hydronic expansion tanks provide engraved equipment tag with the following additional information: Tank pre-charge pressure in pounds per square inch gauge (PSIG) and system volume in gallons.
 - iv. For equipment systems containing refrigerants provide engraved equipment tag with the following additional information: Refrigerant type and system volume in gallons.

SECTION 20 07 00 – MECHANICAL INSULATION

Section includes: Insulation for mechanical systems and equipment.

1. Design Requirements

- a. Insulation thickness, and corresponding R value to be no less than the minimum required by IECC or ASHRAE Standard 90.1.
- b. Provide vapor tight insulation for all piping and valves operating below space dewpoint temperature.
- c. Provide means for access to maintainable components.

2. Products

- a. Pipe, fittings, and valves insulation:
 - i. Fiberglass insulation with factory-applied vapor barrier (All-Service Jacket)
 - ii. PVC or metal jacket as required.
 - iii. For refrigerant piping: pre-formed closed-cell insulation with protective sealant coating or jacketing.
- b. Duct insulation:

- i. Fiberglass insulation with factory applied vapor barrier (Foil-Scrim-Kraft or All-Service Jacket).
- ii. 2-inch minimum rigid insulation as required
- iii. Fiberglass or canvas jacket with vapor tight coating as required

3. Execution

a. Pipe, fittings, and valves insulation:

- i. Insulate all domestic hot, cold, and recirculation water piping.
- ii. Insulate piping systems operating below 55°F.
- iii. Insulate piping systems operating above 85°F.
- iv. Aluminum jacket on all exposed exterior piping and interior piping subject to damage.
- v. PVC jacket on all exposed interior piping within public view or below 8 feet AFF.

b. Duct insulation:

- i. Insulate outside air, relief air, exhaust air, and supply air duct systems per ASHRAE 90.1 and where indicated.
- ii. Fiberglass jacketing on all insulated ductwork exposed and below 8 feet AFF.
- iii. Rigid insulation with canvas or fiberglass jacket and vapor tight coating at all outside air and relief/exhaust plenums.

SECTION 20 08 00 – COMMISSIONING OF MECHANICAL SYSTEMS

Section Includes: Overview and recommended level of commissioning for mechanical equipment and systems.

4. Design Requirements

- a. The commissioning process is a quality-focused process for enhancing the delivery of a project. This process focuses upon verifying and documenting that the commissioned systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements (OPR).
- b. The SCF Project Manager will assign the duties of carrying out the Commissioning Process to the project's Commissioning Authority (CxA). The CxA is a formally certified entity (i.e., ASHRAE Certified Building Commissioning Professional (BCxP)) who leads, plans, schedules and coordinates the commissioning process. The CxA may be assigned by SCF

as a separate independent entity from the A/E design team through a CxA Contract, or as a member of the A/E design team as an additional service.

- c. During the project Design Phase, the CxA will prepare the Section 01 91 00 – COMMISSIONING specification section and supporting discipline specific commissioning sections in each appropriate Division for inclusion in the project bid documents. The commissioning specification sections are written to meet the intent of the OPR document utilizing the process defined by the commissioning reference documents modified for the scope of commissioning support services defined and authorized by SCF. The specifications include:
 - i. Commissioning objectives and scope.
 - ii. Definitions of commissioning team members.
 - iii. Definitions of commissioning terminology.
 - iv. Description of the commissioning process.
 - v. Sample Commissioning Master Equipment and Systems Log.
 - vi. Sample Pre-functional (PC) and Functional Performance Test (FT) checklists.
- d. Commissioning Reference Documents include:
 - i. ANSI/ASHRAE/IES Standard 202 – Commissioning Process for Buildings and Systems
 - ii. SMACNA HVAC Systems Commissioning Manual
 - iii. ASHE Health Facility Commissioning Guidelines
- e. Variations in project size and complexity, the presence of critical or highly specialized systems and SCF requirements suggest describing the commissioning process in terms of different "levels" of commissioning. The SCF Project Manager will define the level of commissioning support to be provided on an individual project basis to the A/E.

The CxA will specify the level of commissioning effort in Section 01 91 00 – COMMISSIONING. Note that some projects may encompass all three levels of the commissioning process.

Default Applications below subject to SCF discretion.

The three basic levels include:

- i. Level 1 - Basic Commissioning
 - I. Level 1 commissioning is carried out by the Contractor during the construction and acceptance phases of a project. Level 1

Basic Commissioning is to be utilized for projects without complex systems (e.g., office or administrative buildings).

II. SCF Applications:

a) Administrative office type occupancies

ii. Level 2 Comprehensive Commissioning (AND per ASHE Health Facility Commissioning Guidelines)

- I. Level 2 commissioning is a comprehensive commissioning process and usually starts in the pre-design or design phase and extends through construction and acceptance phases of the project. This level of commissioning has more formal documentation and training requirements and is usually recommended for a more complex facility (e.g., teaching laboratory, engineering, and science buildings).

II. SCF Applications:

a) Clinic & Health type occupancies

iii. Level 3 – Critical Systems Commissioning

- I. Level 3 commissioning is required for systems in critical applications involving life safety, health risks, high value processing or research. This level of commissioning verifies correct system functional performance with all specified environmental criteria maintained under the entire range of expected loads and operations (e.g., research laboratory, other critical spaces).

II. SCF Applications:

a) Critical applications involving life safety, health risks or high value processing

5. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

6. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 21 – FIRE SUPPRESSION

SECTION 21 12 00 – FIRE-SUPPRESSION STANDPIPES

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 21 13 13 – WET-PIPE SPRINKLER SYSTEMS

1. Design Requirements
 - a. Wet Pipe Sprinkler System Design shall be by NICET Level IV certified fire protection technician, fire protection engineer, or mechanical engineer who has relevant fire protection design experience and is registered in the State of Alaska. Each drawing and the cover of each set of calculations signed and dated by the NICET certified technician or engineer.
 - b. Wet Pipe Sprinkler System Design may need to comply with the guidance of relevant FM Global requirements, per the direction of SCF.
 - c. NFPA 13 protection shall be provided as a minimum as the baseline protection level for all sprinkler systems. NFPA 13R and NFPA 13D shall not be used.
 - d. Hydraulic calculations for each sprinkler zone shall demonstrate that the required pressure is a minimum 10% lower than supplied pressure at design flow rate.
 - e. Sprinkler system designer shall provide justification for wet pipe, dry pipe or pre-action systems before design. Glycol based sprinkler systems shall NOT be used.
 - f. Work in Existing Buildings: Assess existing fire protection system conditions before proceeding with the work. If adequate, reuse the existing system or modify as needed to meet the project requirements. Provide a new fire protection system where the existing system cannot be reused, or the modifications to the existing system are not cost effective.
 - g. Existing sprinkler system modifications: The sprinkler system designer shall provide calculations showing the existing and modified sprinkler system water properties are sufficient.
 - h. Seismic bracing. The sprinkler system designer shall provide the appropriate horizontal force factor within the bid documents, for use in NICET Designer's analysis of horizontal bracing. Seismic bracing shall also comply with FM global requirements for sprinkler bracing for the project site.

- i. System and test drains shall drain outside building to a point clear of building foundation. Make provisions for draining inside the building during cold weather. Size interior drain system for full flow during winter draining. Drains shall not be permitted to empty on walkways, or to otherwise create a freezing water hazard.
- j. Zone sprinkler piping in the building by floor to the extent possible. Additionally sub-zone sprinkler piping by building wing if the building layout is conducive to zoning.
- k. Fire sprinkler systems provided within electrical spaces shall utilize either sidewall heads or piping drip trays.
- l. Flow testing and backflow prevention valves: Install piping and valves to allow for a full forward flow test of the backflow preventer. A full flow test shall be witnessed by Fire Sprinkler Designer of Record and description of testing and results shall be recorded in the project Operation and Maintenance Manuals. Annual flow testing shall comply with the requirements of FM global.
 - i. System approval shall be by written review and approval of the entire fire protection system design and arrangement from the following authorities are required:
 - I. Design engineer of record
 - II. Authority Having Jurisdiction following revised submittal process in Division 1
 - III. Facilities Services

2. Products

- a. All products shall be third party independent, (e.g. U.L or F.M.) listed, labeled, and specifically approved for the fire protection application where they are used. Test or pressure gauges must include manufacturer or calibration dates within one year of substantial completion date.
 - i. Backflow preventer assemblies must be listed by Foundation for Cross-Connection Control and Hydraulic Research. Approved backflow prevention valves: Febco, Watts, or Ames; no alternate brands, no substitutions.
 - ii. No Butterfly type valves shall be used in fire protection service.
 - iii. Sprinkler piping shall comply with the requirements of NFPA 13 and FM global.
 - iv. Flexible sprinkler heads shall be a flexible hose with threaded end fittings for sprinkler head installations heads shall be stainless steel braided and equivalent to 1-inch schedule for flow and pressure drop. Flex heads shall comply with FM Global requirements.

- v. Sprinkler escutcheons shall be provided for all sprinklers.
- vi. Galvanized pipe shall not be used.

3. Execution

- a. Sprinkler system testing: Air or hydrostatic testing shall be performed for all new and modified systems unless otherwise exempted by NFPA.
- b. Sprinkler system maintenance elements: Access panels shall be provided to areas of concealed piping for purposes of inspection and maintenance.
- c. Sprinkler riser rooms: Verify and document that sufficient space exists for clearance and maintenance available around the sprinkler riser, and other sprinkler system components.
- d. Couplings: Do not install couplings within floor, wall or grade beam sleeves.
- e. Access doors shall be provided for all concealed or hidden sprinkler system elements requiring inspection, review or maintenance.

SECTION 21 13 16 – DRY-PIPE SPRINKLER SYSTEMS

1. Design Requirements

- a. Dry Pipe Sprinkler System Design shall be by NICET Level IV certified fire protection technician, fire protection engineer, or mechanical engineer who has relevant fire protection design experience and is registered in the State of Alaska. Each drawing and the cover of each set of calculations signed and dated by the NICET certified technician or engineer.
- b. Dry Pipe Sprinkler System Design may need to comply with the guidance of relevant FM Global requirements, per the direction of SCF
- c. NFPA 13 protection shall be provided as a minimum as the baseline protection level for all sprinkler systems. NFPA 13R and NFPA 13D shall not be used.
- d. Hydraulic calculations for each sprinkler zone shall demonstrate that the required pressure is a minimum 10% lower than supplied pressure at design flow rate.
- e. Sprinkler system designer shall provide justification for a wet pipe, dry pipe or preaction system before design. Glycol-based sprinkler systems shall NOT be used.
- f. Use dry sprinkler pendent or sidewall sprinkler heads in or near any exterior vestibules, or other locations that may be prone to freezing.
- g. Work in Existing Buildings: Assess existing fire protection system conditions before proceeding with the work. If adequate, reuse the existing system or modified as needed to meet the project requirements. Provide new fire

protection system where the existing system cannot be reused, or the modifications of the existing system are not cost effective.

- h. Existing sprinkler system modifications: Sprinkler system designer shall provide calculations showing the existing and modified sprinkler system water properties are sufficient.
- i. Seismic bracing: Sprinkler system designer shall provide the horizontal force factor within the bid documents, for use in NICET Designer's analysis of horizontal bracing. Seismic bracing shall also comply with FM global requirements for sprinkler bracing for the project site.
- j. Upright heads shall be used in any location where piping is exposed and maintenance activity in the area is considered to be frequent or reliant upon ladders or other potentially impacting materials from below.
- k. System and test drains shall drain outside building to a point clear of building foundation. Make provisions for draining inside the building during cold weather. Size interior drain system for full flow during winter draining. Drains shall not be permitted to empty on walkways, or to otherwise create a freezing water hazard.
- l. Zone sprinkler piping in the building by floor to the extent possible. Additionally sub-zone sprinkler piping by building wing if the building layout is conducive to zoning.
- m. Flow testing and backflow prevention valves: Install piping and valves to allow for a full forward flow test of the backflow preventer. A full flow test shall be witnessed by FS/DDC and description of testing and results in the project O&M Manuals. Annual flow testing shall comply with the requirements of FM global.
- n. System approval shall be by written review and approval of the entire fire protection system design and arrangement from the following authorities are required:
 - i. Design engineer of record
 - ii. Authority Having Jurisdiction following revised submittal process in Division 1
 - iii. Facilities Services
- o. Design engineer to discuss the use of nitrogen inerting and generators with SCF PM.

2. Products

- a. All products shall be third party independent, (e.g. U.L or F.M.) listed, labeled, and specifically approved for the fire protection application where they are

used. Test or pressure gauges must include manufacturer or calibration dates within one year of substantial completion date

- b. Backflow preventer assemblies must be listed by Foundation for Cross-Connection Control and Hydraulic Research. Backflow prevention valves: Febco, Watts, or Ames, no alternate brands, no substitutions.
- c. No Butterfly type valves shall be used in fire protection service.
- d. Sprinkler piping shall comply with the requirements of NFPA 13 and FM global.
- e. Flexible sprinkler heads shall be a flexible hose with threaded end fittings for sprinkler head installations heads shall be stainless steel braided and equivalent to 1-inch schedule for flow and pressure drop. Flex heads shall comply with FM Global requirements.
- f. Sprinkler escutcheons shall be provided for all sprinklers.
- g. Malleable iron fittings shall be used exclusively within dry pipe systems.
- h. Galvanized pipe shall not be used.
- i. Pressure independent valves shall be provided within dry pipe systems, to withstand system upsets due to potential upstream surges in system pressure.

3. Execution

- a. Sprinkler system testing: Air or hydrostatic testing shall be provided for all new and modified systems unless otherwise exempted by NFPA.
- b. Sprinkler system maintenance elements: Access panels shall be provided to areas of concealed piping for purposes of inspection and maintenance.
- c. Sprinkler riser rooms: Verify and document that there is sufficient space for clearance and maintenance available around the sprinkler riser, and other sprinkler system components.
- d. Couplings: Do not install couplings in floor, wall or grade beam sleeves.
- e. Access doors shall be provided for all concealed or hidden sprinkler system elements requiring inspection, review or maintenance.
- f. Verify all exterior penetrations are sealed properly to protect against cold air intrusion into the facilities.

SECTION 21 34 13 – PRESSURE-MAINTENANCE PUMPS

- 1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 2. Products

- a. Fire pumps are preferred to be electric in locations with reliable electric supply and diesel driven in remote locations.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 22 – PLUMBING

SECTION 22 10 00 – DOMESTIC WATER PIPING AND SPECIALTIES

Section includes: Domestic water piping and specialties and indirect water heaters.

1. Design Requirements
 - a. Route distribution and branch piping above grade.
2. Products
 - a. Pipe, fittings, valves, and equipment shall be listed as lead-free and meeting the requirements of the 2011 Reduction of Lead in Drinking Water Act.
 - b. Below grade pipe: Class 52 cement lined ductile iron pipe with mechanically restrained joints.
 - c. Above grade pipe: Hard drawn copper Type L piping with lead free soldered joints or press fittings. Concealed press fittings are not acceptable. PEX tubing may be acceptable in rural/residential applications; review with SCF.
 - d. Trap primer pipe: Annealed copper tubing or PEX tubing.
 - e. Unions: Provide equipment to allow removal for servicing/replacement.
 - f. Valves: Use of butterfly valves is not acceptable where tight shut off is required for equipment maintenance. Use ball or gate type valves at these locations.
 - g. Trap primers: Nonelectric type preferred if feasible.
 - h. Tempering valves: Provide unions and isolation valves.
 - i. Circulation pumps: Grundfos, Armstrong pumps or pre-approved equal.
 - j. Expansion tanks: ASME stamped. Provide diaphragm or full-acceptance bladder type.
 - k. Water hammer arresters: Pressurized piston type. Sioux Chief, PPP or pre-approved equal.
 - l. Pressure gauges: Provide minimum 2½-inch-diameter gauge face. Provide isolation valve and pressure snubber.
 - m. Thermometers: Digital self-powered if lighting is adequate for charging. 1% accuracy.
 - n. Indirect water heaters: Double-wall heat exchanger. Triangle Tube, Aerco Smart Plate or pre-approved equal.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 22 13 00 – SANITARY WASTE AND VENT PIPING AND SPECIALTIES

Section includes: Sanitary waste and vent piping and specialties.

1. Design Requirements

a. Lift Stations

- i. For larger systems, provide for external backup pumping in event of total pump failure
- ii. Probe type level sensors preferred over floats.

b. Cleanouts

i. Accessibility

- I. Cleanouts must be easily accessible.
 - II. Locate sanitary waste piping cleanouts in the floor or wall, above flood rim of highest fixture served.
 - III. Cleanouts in above-ceiling space are not acceptable.
- ii. Provide extra cleanouts in addition to UPC requirements.
 - iii. Coordinate cleanout locations with occupancy to allow access by maintenance staff with minimal disruption to tenant operations.

2. Products

a. Below grade pipe: Cast iron no hub with heavy-duty stainless-steel couplings. Minimum of four stainless steel coupling straps, 0.015-inch-thick shield with stainless steel hardware.

b. Above grade pipe

- i. Cast iron no hub with heavy-duty stainless-steel couplings. Minimum of four stainless steel coupling straps, 0.010-inch-thick shield with stainless steel hardware.
- ii. DWV copper with wrought copper fittings.

c. Cleanouts

- i. Wall cleanouts to have wall plate with center screw.

d. Sump pumps: Under sink sumps are generally not acceptable.

e. Lift stations

- i. Provide duplex pumps on guide rails and a standalone pump control panel with alarm connections to the building automation system. Non-proprietary mounting systems preferred. Hydromatic, Flygt or pre-approved equal.

3. Execution

a. Cleanouts

- i. Floor cleanouts are to have their cover plates at finish floor elevation. Cleanout covers with carpet or flooring cover are not acceptable.

SECTION 22 14 00 – STORM DRAINAGE PIPING AND SPECIALTIES

Section includes: Storm drainage pipe and specialties.

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products
 - a. Below grade pipe: Cast iron no hub with heavy-duty stainless-steel couplings. Minimum of four stainless steel coupling straps, 0.015-inch-thick shield with stainless steel hardware.
 - b. Above grade pipe: Cast iron no hub with heavy-duty stainless-steel couplings. Minimum of four stainless steel coupling straps, 0.010-inch-thick shield with stainless steel hardware.
 - c. Cleanouts: Provide a cleanout at the base of each riser with a drain valve above.
 - d. Electric heat trace:
 - i. Insertion type, self-regulating heat trace.
 - ii. Constant output and external-type heat trace not acceptable.
3. Execution
 - a. Electric heat trace: Careful consideration for segment length and access for future replacement is of the utmost importance.

SECTION 22 40 00 – PLUMBING FIXTURES

Section includes: Plumbing fixtures & trim & accessories, faucets, drains & traps, flush valves, carriers, including emergency duty. See 22 10 00 for plumbing piping and equipment such as water heaters.

1. Design Requirements
 - a. Mop sinks: avoid sharing rooms with electrical equipment
 - b. Exterior wall hydrant: Provide isolation valve for seasonal shut off.
 - c. Emergency Showers:
 - i. Coordinate with Electrical to keep electrical outlets and devices away from shower spray area.
 - ii. Coordinate with Architectural to ensure wall finishes are appropriate to avoid water damage.
2. Products
 - a. Water closet:
 - i. Fixture: Commercial grade, floor-mounted preferred, vitreous china, elongated bowl, siphon jet, 1½-inch top spud, 1.6 gallons per flush (gpf) capacity.

- ii. Sensor Operated Flush valve: 1.6 gpf valve with sensor that can easily be removed and replaced. Sensor to be hard-wired with manual override button. Battery-powered sensors are not acceptable. Moen, Sloan or pre-approved equal.
 - iii. Seat: Heavy-duty solid plastic, open front, without cover, stainless steel hardware.
 - iv. Carrier (if wall-mounted water closet): Commercial grade, floor mounted, adjustable, no-hub connection. J.R. Smith, Josam, Zurn, MIFAB or pre-approved equal.
- b. Urinal:
- i. Fixture: Commercial grade, wall mounted, vitreous china, flushing rim, siphon jet, 3/4-inch top spud, 1.0 gpf capacity.
 - ii. Sensor Operated Flush valve: 1.0 gpf valve with sensor that can be easily removed and replaced. Sensor to be hard-wired with manual override button. Battery-powered sensors are not acceptable. Moen, Sloan or pre-approved equal.
 - iii. Carrier: Commercial grade, floor mounted, adjustable support plate. J.R. Smith, Josam, Zurn, MIFAB or pre-approved equal.
- c. Restroom wall or counter mounted lavatory with sensor faucet:
- i. Fixture: Commercial grade, single hole, vitreous china or as applicable, ADA compliant, wall-mount suitable for use with concealed arm carrier.
 - ii. Faucet: Commercial grade, polished chrome. Hardwire sensor operated. No battery powered sensors allowed. ADA-compliant. Moen, Delta, Chicago Faucets, Speakman or pre-approved equal.
 - iii. Drain and trap: Chrome-plated brass, grid drain. Provide a 1½-inch trap with cleanout.
 - iv. Supplies and stops: Stainless steel flexible supplies; brass, quarter-turn, removable key type stops. Plastic parts not acceptable. ADA compliant
 - v. Carrier: Required for wall mount fixture; Commercial grade, floor mounted, adjustable header, concealed arms. J.R. Smith, Josam, Zurn, MIFAB or pre-approved equal.
- d. Wall or counter mounted lavatory with single lever faucet:
- i. Fixture: Commercial grade, single hole, vitreous china or as applicable, ADA compliant, wall mount suitable for use with concealed arm carrier.

- ii. Faucet: Commercial grade, polished chrome-plated brass, single lever. ADA-compliant. Moen, Delta, Chicago Faucets, Speakman or pre-approved equal.
 - iii. Drain and trap: Chrome-plated brass, grid drain. Provide a 1½-inch trap with cleanout.
 - iv. Supplies and stops: Stainless steel flexible supplies; brass, quarter-turn, removable key type stops. Plastic parts not acceptable. ADA compliant
 - v. Carrier: Required for wall mount fixture; floor mounted, adjustable header, concealed arms. J.R. Smith, Josam, Zurn, MIFAB or pre-approved equal.
 - vi. Single and double compartment sinks: Provide 1½-inch trap and cleanout.
- e. Mop sink: For use in typical janitor closets.
- i. Fixture: Commercial grade, 24- x 24-inch floor mounted, molded stone or high-density composite, stainless steel drain body, In-drain strainers (recessed stainless steel dome strainer/lint basket). Fiat, ProFlo or pre-approved equal.
 - ii. Faucet: Commercial grade, wall mounted, vacuum breaker, integral stops, cross handles, pail hook, wall brace, hose-end spout. Delta, Moen or pre-approved equal.
 - iii. Accessories: Hose with wall hanger, stainless steel mop hanger, stainless steel bumper guards, stainless steel wall guards.
- f. Floor Sink: mount with rim flush to adjacent floor; include internal strainer and top cover grate.
- g. Drinking Fountain: Filtered, Self-contained non-refrigeration type preferred, ADA compliant. Elkay, Haws or pre-approved equal.
- h. Water Bottle Filling Station: Filtered, Self-contained non-refrigeration type preferred, ADA compliant. Elkay, Haws or pre-approved equal. May be integrated with drinking fountains with approval.
- i. Grease interceptor: Timer operated automatic self-cleaning, integral flow control. Big Dipper or equal, with heat element.
- j. Shower mixing valve: Commercial grade. Delta, Moen or pre-approved equal.
- k. Washer connection boxes: metal preferred
- l. Exterior wall hydrant with cover: Commercial grade, freeze-proof with vacuum breaker, lockable cover and key-operated valve.

- m. Solids and sand interceptors: Locate the interceptor so it is easily accessible and easy to clean.
 - n. Light-duty floor drain: For toilet rooms and general use. Provide trap primer.
 - o. Medium-duty floor drain: For boiler and mechanical rooms. Provide trap primer.
 - p. Cleanouts: Provide floor cleanouts spaced every 50 feet (maximum), at all major branches and at all toilet rooms. Provide extra cleanouts!
 - q. Emergency Showers: Provide floor drain for drainage.
 - r. Emergency Eyewashes: Avoid faucet-mounted type and pull-down type. Drench hose or swing-arm preferred.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 22 60 00 – COMPRESSED AIR FOR LABORATORY FACILITIES

Section includes: Compressed air systems for laboratory facilities.

- 1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 2. Products
 - a. Compressed air piping: Hard drawn Type L hard drawn copper piping preferred.
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 22 67 00 – PROCESSED WATER PIPING AND EQUIPMENT FOR LABORATORY AND HEALTHCARE FACILITIES

Section includes: Piping and equipment for Types I, II, and III reagent water and/or Deionized, distilled, and reverse-osmosis special-purpose water.

- 1. Design Requirements
 - a. Plastic piping in plenums must be fire-wrapped.
- 2. Products
 - a. Reverse Osmosis Systems:
 - i. Central Equipment: high-pressure pump with particle pre-filter module and two-stage membrane module. Provide on a common frame including controls and instrumentation. Provide with ability to connect trouble alarm to BMS.
 - ii. Piping: PP or PVDF plastic; glass; or stainless steel.
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

SECTION 23 01 30 – EXISTING HVAC AIR DISTRIBUTION SYSTEM CLEANING

Section Includes: Cleaning of interior of existing ducts and equipment after construction and before commissioning.

1. Design Requirements
 - a. Visual evaluation of ducts to remain may be required during design. Duct cleaning is generally preferred. Consult with SCF to determine the need for cleaning of existing duct system on a case-by-case basis.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 05 10 – INSTRUMENTS, HANGERS, SUPPORTS, AND ACCESSORIES FOR HVAC PIPING

Section Includes: miscellaneous components related to HVAC piping

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products
 - a. Provide hanger materials that are appropriate for the intended piping material.
3. Execution
 - a. Locate and orient instruments to be read from floor level.

SECTION 23 05 20 – HVAC VALVES

Section Includes: Isolation, balancing, and other valves for HVAC piping.

1. Design Requirements
 - a. Size all hydronic valves based on pipe size and not based on the coil or equipment connections. Exceptions are control valves that should be sized based on the required valve authority.
 - b. Automatic flow balancing valves are preferred at all VAV and Terminal Units with reheat coils.
 - c. Balancing valves shall not be used as isolation valves.
2. Products
 - a. Generally, provide brass valves in piping 2 inches and smaller; provide iron valves in piping 2-1/2 inches and larger.
 - b. Provide Full Port type ball valves.
 - c. Provide balancing valves with memory stop and dial.
 - d. Triple duty valves shall not be used.
3. Execution

- a. Location:
 - i. Provide isolation valves at each major system branch and on each floor.
 - ii. Provide Isolation valves on inlet and outlet coil piping at Air Handlers, VAV Boxes, Fan Coil Units, Radiant Heaters, and all other coil connections.
 - iii. Locate mains and shutoff valves in hallways and corridors, not in occupied rooms. Valves to be within 18 inches of the main.

SECTION 23 05 33 – HEAT TRACING FOR HVAC PIPING

Section Includes: Electric or glycol-loop freeze protection for HVAC piping. (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 05 48 – VIBRATION AND SEISMIC CONTROLS FOR HVAC

Section Includes:

1. Design Requirements
 - a. Refer to 13 48 00 – Vibration and Seismic Control
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 05 66 – ANTIMICROBIAL ULTRAVIOLET LAMP SYSTEMS FOR HVAC

Section Includes: permanently mounted UV lamps intended for mitigation of pathogens

1. Design Requirements
 - a. UV systems are generally not desired.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

Section Includes: measurement and adjustment of water and air flow rates to meet design values

1. Design Requirements
 - a. When considering modifying or adjusting existing systems, perform TAB to establish flow rates in all branches before making any modifications to system. Adjust central equipment as required and restore all unmodified branches and outlets to their original condition. Obtain existing system drawings from SCF PM and become familiar with the extent and nature of existing systems. Use the balancing information to confirm system capacities.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

3. Execution

- a. Where air change rates are required for regulatory compliance, include ACH calculations in TAB report.

SECTION 23 11 00 – BUILDING FUEL SYSTEMS

Section includes: Fuel gas piping and fuel oil piping, pumps, and storage tanks.

1. Design Requirements

- a. Gas Fuel train must comply with FM Global 6-4.
- b. Provide seismic shutoff isolation valve at gas main.
- c. Small gas pressure regulators may vent indoors if fitted with vent-limiting means.
- d. Provide fuel oil polishing systems for tank systems larger than 5000 gallons to address condensation and other related storage issues.
- e. Size fuel oil storage tanks and day tanks to provide at least minimum duration established in discussions with SCF. Capacity requirements may exceed code requirements especially in remote locations.
- f. Coordinate with design team to provide adequate overhead protection so that falling snow/ice from the adjacent roof does not damage fuel piping. Consider location of tank.

2. Products

- a. Fuel gas distribution:
 - i. Above ground piping:
 - I. Medium pressure (2 PSIG or higher): Steel pipe with welded fittings.
 - II. Low pressure (less than 14 inches water column): Steel pipe with threaded fittings. Provide unions and dirt leg at equipment.
- b. Fuel oil storage tanks:
 - i. Underground fuel oil storage tanks: Not acceptable.
 - ii. Aboveground fuel oil tanks:
 - I. Provide double wall containment tank with interstitial space leak detection.
 - iii. Controls & Alarms:
 - I. Provide bulk and day tanks with local panel with alarms for low level, high level, interstitial leak
 - II. Coordinate requirements for integration with BAS and wireless

3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 20 00 – HVAC PIPING AND PUMPS

Section Includes: Hydronic piping and specialties, hydronic pumps.

1. Design Requirements
 - a. Hydronic heating water distribution:
 - i. In hydronic systems larger than 1000-gallon total volume provide 2-inch rapid system fill connection with full port ball valve and camlock fitting with cap.
 - b. Pressure gauges: Provide isolation valve.
 - c. Unions: Provide at equipment to allow removal for servicing.
 - d. Strainers: Provide with:
 - i. blowdown connection consisting of a full port quarter turn ball valve and capped hose connection
 - ii. isolation valves to facilitate strainer basket removal with minimal system drain down
 - iii. differential pressure indicators across the strainer
 - iv. magnetic strainers at pumps with EC motors
 - e. Hydronic pumps:
 - i. Select pump impellers sized greater than minimum size and less than 10 percent below maximum size.
 - ii. Specify non-overloading motors.
 - iii. Provide magnetic strainers for pumps with EC motors.
 - iv. Indicate minimum pump efficiency in Construction Documents.
2. Products
 - a. Water system piping:
 - i. Schedule 40 Steel (ASTM A53 or A106) with welded fittings.
 - ii. Hard drawn copper Type L piping with soldered wrought copper fittings. Press or grooved fittings and joints are acceptable.
 - b. Glycol system piping:
 - i. Schedule 40 Steel (ASTM A53 or A106) with welded fittings.
 - ii. Hard drawn copper Type L piping with soldered or brazed fittings and joints. Press or grooved fittings and joints are acceptable.
 - c. Pressure gauges: Provide minimum 2½-inch-diameter gauge face.
 - d. Thermometers: Digital self-power type preferred.
 - e. Expansion tanks: ASME stamped, diaphragm or full-acceptance bladder type.
 - f. Air and dirt separators: Coalescing type combination air and dirt.
 - g. Air vents: Provide isolation valve. Minimum 150 PSIG pressure rating.
 - h. Glycol makeup system, automatic (where allowed): Self-contained tank and pump and pressure control assembly.

- i. Glycol solution: Premixed 50/50 propylene glycol water solution with colored dye is utilized. Specify product that is locally stocked.
 - j. Hydronic pumps:
 - i. In-line and vertical in-line type pumps preferred.
 - ii. Manufacturers: Grundfos, Armstrong and Taco or pre-approved equal.
 - I. Avoid Grundfos for remote applications; prefer Armstrong or Taco.
3. Execution
- a. Strainers:
 - i. remove fine mesh construction phase strainers before building turnover
 - b. Support pumps independent of piping.

SECTION 23 30 00 – HVAC AIR DISTRIBUTION

Section Includes: Ducts and accessories and air terminal units.

- 1. Design Requirements
 - a. Ducts and accessories:
 - i. Flexible ductwork: Provide a maximum of 6 feet of independently supported flexible duct with one 90-degree bend for each supply diffuser connection.
 - ii. Fire/smoke dampers: Provide packaged damper monitoring and testing system with alarm contact from monitoring panel to building automation system.
 - b. Air terminal units:
 - i. Avoid use of fan powered air terminal units.
 - ii. Provide reheat coils for all air terminal units, even if auxiliary heating is provided within the room.
 - iii. Provide hard duct connections to air terminal unit inlets. Use of flexible duct connections is not acceptable.
- 2. Products
 - a. Ductwork: Construction per SMACNA guidelines. Spiral wound round ductwork preferred.
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 34 00 – HVAC FANS

Section Includes: Fans for HVAC duty, either standalone or as part of packaged or custom air handlers

- 1. Design Requirements
 - a. Provide fans with direct drive motors where possible.

- b. Provide fans with 1800 RPM maximum speed where possible.
 - c. For variable airflow applications, provide fans with minimum 30% turndown from the design airflow, or as required to maintain minimum design airflow requirement; whichever is lower.
 - d. Furnish fans exposed to weather with heavy gauge protective covers over bearings and shaft assembly.
 - e. Minimize system effect by:
 - i. Providing 2 to 3 duct diameters of straight duct at the fan inlet and outlet.
 - ii. Selecting fan rotation based on the connected duct configuration.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 37 00 – GRILLES REGISTERS AND DIFFUSERS, LOUVERS AND HOODS

Section Includes: Air inlets and outlets including indoor distribution and outdoor interfaces.

1. Design Requirements
 - a. Specify Air diffusers with adjustable core diffuser blades.
 - b. Select location and type of supply diffusers and return/exhaust registers in each occupied space such that air change effectiveness is maximized. Refer to ASHRAE Standard 113 for evaluation of the air distribution effectiveness of various room air distribution system in achieving required thermal comfort.
 - c. Use manufacturer published data for the selected supply diffusers when determining room airflow coverage and air velocities in occupied zone.
 - d. For Group A outlets (high sidewall diffusers, ceiling diffusers, linear ceiling diffuser and similar outlets), heating supply air temperature shall not exceed room temperature set point by more than 15°F.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 38 00 – COMMERCIAL KITCHEN HOODS

Section Includes: purpose-built packaged kitchen hoods including associated makeup air units

1. Design Requirements
 - a. SCF prefers dedicated makeup air units for kitchen hood applications
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 40 00 – HVAC AIR CLEANING DEVICES

Section includes: Particulate, gas-phase, and electronic air filtration

1. Design Requirements
 - a. SCF prefers to reduce the number and type of filters used on campus.
 - b. Provide 24x24 filter size whenever possible.
 - c. Maximum air velocity 500 fpm through filter media.
 - d. Provide individual analog differential pressure gauges across each filter bank to facilitate monitoring of filter loading condition.
 - e. Provide pre-filters in front of final filters.
 - f. Electrostatic air filters are not acceptable.
 - g. Avoid UV except stationary applications such as cooling coil drain pans.
 - h. Soft ionization should be considered for central air handling systems.
2. Products
 - a. Pre-filtration: MERV 8 pre-filters. UL listed, durable, self-supporting synthetic media filters.
 - b. Final filtration: MERV 14 per ASHRAE 52.2. UL listed, durable, plastic or metal frame construction, 12-inch deep synthetic media filters.
3. Execution
 - a. Specify that new filters be provided at project completion.

SECTION 23 50 00 – CENTRAL HEATING EQUIPMENT

Section includes: Vents, chimneys, boilers, heat exchangers, fuel-fired heaters, and furnaces.

1. Design Requirements
 - a. Vents and Chimneys and accessories
 - i. Individual venting of each appliance is preferred
 - ii. Ducted combustion air system is preferred, but not required. If room air is used for combustion, provisions shall be taken to prevent freezing of the piping and water tanks inside the room. Account for dust and dirt accumulation on the screens installed at combustion air intakes.
 - iii. Provide Boiler Manufacturer confirmation of Design of gas flue and combustion air before design completion.
 - b. Boilers:
 - i. Provide outside air fan for equipment room cooling when using sealed combustion.
 - ii. Control: Provide integral boiler control panel from manufacturer. Integration with BMS is required.
 - c. Furnaces are acceptable when applicable.
2. Products

- a. Natural gas boilers: High-efficiency gas fired condensing boilers with packaged controls. Sealed combustion with direct vent and ducted combustion air. Fully modulating with minimum of 15:1 turndown.
 - b. Fuel Oil boilers: for remote application, preference is cast-iron sectional for simplicity and reliability.
 - c. Plate type heat exchangers: Braze plate or plate and frame type heat exchangers preferred.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 60 00 – REFRIGERANT COMPRESSOR AND CONDENSER EQUIPMENT

Section Includes: Packaged outdoor equipment for refrigerant-based cooling and/or heating

1. Design Requirements
 - a. Consider refrigerant type and availability when selecting equipment. Avoid refrigerants being phased out within 5 years.
 - b. Consider vibration isolation and noise generation when selecting and locating equipment.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 70 00 – AIR HANDLING AND ENERGY RECOVERY EQUIPMENT

Section includes: Heat Recovery Units, Indoor, Outdoor, Packaged, Basic, Semi-Custom, Custom Air-Handling Units.

1. Design Requirements
 - a. Fans shall have minimum efficiency of 65%.
 - b. Multiple supply and return fans or fan arrays are preferred over single utility type fan.
 - c. Use direct drive fans where practical.
 - d. AHU Coils
 - i. Specify coils with vents and drains.
 - ii. Coils shall be sized for maximum air velocity of 400 fpm.
 - iii. Size heating coils for maximum 140°F entering water temperature and minimum 30°F water temperature drop.
 - e. Heat pipes, heat recovery coils, or air-to-air exchangers are preferred over heat-recovery wheels. If a heat-recovery wheel is proposed by the design team, review the design requirements and equipment performance with SCF.
 - f. Provide catwalk if the access doors are located more than 24 inches AFF or roof.
2. Products

- a. AHU Cabinets
 - i. AHU doors shall be provided at each unit section and be gasketed to ensure air and water tightness with viewing window in fan section.
 - ii. Provide solid non-perforated metal liner over insulation on inside of AHU cabinet.
 - iii. Drain pans shall be double sloped, in direction of airflow and toward drain connection.
 - iv. All fans must have vibration isolation; exceptions are factory constructed fan arrays where factory testing and certification is provided that fans are factory balanced within each individual cell and additional vibration isolation is not required.
- b. Dampers:
 - i. All dampers shall be low leakage dampers.
 - ii. Provide separate minimum outside air damper and economizer damper.
 - iii. Arrange return air damper and minimum outside air damper to discharge against each other and maximize air mixing within the mixed air plenum.
 - iv. Under minimum outside air operation, mixed air temperature gradient across the width of the mixing box shall be less than 10°F.
- c. AHU Coils
 - i. Heating and cooling coils shall be aluminum finned copper tube with fin spacing no tighter than 10 fins per inch. Coils may be used for cooling, dehumidifying, and heating air and should meet the requirements of the Air Conditioning and Refrigeration Institute (ARI). Coil capacity ratings shall be certified in accordance with ARI Standard 410-72.
 - ii. Cooling coils shall be provided with stainless steel coil frame, stainless steel support rack, and stainless-steel drain pan for each level of cooling coils. Maximum 8 row cooling coils are allowed.
 - iii. Provide LED lighting within AHUs in each compartment separation; wired to a common switch.
 - iv. Provide separate, external, weatherproof NEMA rated enclosure for field mounted control components.

3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 81 23 – DECENTRALIZED AIR CONDITIONING EQUIPMENT

Section includes: Computer Room AC, dedicated split systems.

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

2. Products
 - a. SCF prefers Dedicated split or multi-split units
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 81 40 – HEAT PUMPS

Section Includes: Variable refrigerant flow (VRF) systems and ground source heat pumps

1. Design Requirements
 - a. Sustainability
 - i. Consideration of electric heat pumps is encouraged as an alternative to fossil fuel use.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 23 82 00 – TERMINAL HEATING UNITS

Section includes: Terminal heating equipment.

1. Design Requirements
 - a. Ceiling radiant panels: avoid unless using high-temperature (180°F) hydronic system
2. Products
 - a. Cabinet unit heaters: Fully recessed, wall mount preferred. Downflow air path with discharge towards floor.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 25 – INTEGRATED AUTOMATION

SECTION 25 10 00 – BUILDING AUTOMATION SYSTEM

Section Includes: Control systems for building automation

1. Design Requirements
 - a. Johnson Controls is the provider for Building Automation Systems (BAS). Consider converting/upgrading existing buildings with other BAS systems to Johnson Controls on a case-by-case basis.
 - b. Avoid need for integration of third-party control devices or drivers. If integration is required, either Modbus or BACnet communication protocol is acceptable.
 - i. Specifically avoid standalone controllers for snowmelt systems.
 - c. Coordinate with SCF for BAS workstation needs at each facility. Needs may include:
 - i. One BAS workstation computer to provide access and control of the new building, connected to the existing SCF BAS network.
 - ii. A laptop workstation may be required instead of or in addition to the desktop workstation.
 - iii. A dedicated location for the BAS workstation.
 - d. Meter all incoming building utilities (water, electricity, gas, heating and cooling utilities, as applicable) with output connection to the BAS.
2. Products
 - a. Network Architecture: Ethernet panels are preferred
 - b. Panels: Provide expansion capacity within each panel.
3. Execution
 - a. Route All BAS control wiring in conduit. Identify BAS junction boxes with labels.
 - b. Include SCF assigned room numbers on BAS screen graphics.

SECTION 25 30 00 – BUILDING AUTOMATION SYSTEM FIELD DEVICES

Section includes: Building Automation System field devices.

1. Design Requirements
 - a. Control AHUs using BAS instead of on-board proprietary controllers.
 - b. Control Snowmelt systems using BAS instead of stand-alone controllers.
2. Products
 - a. Variable speed drives (VSDs): No Bypass. Control via hardwire only; integrate with controller for monitoring of key parameters. ABB, Danfoss, or pre-approved equal.

- b. Airflow Measuring Station: Thermal dispersion technology type airflow measuring station with integral transmitter. Accuracy 2% of reading. Airflow measuring stations integrated into damper or louver products are not acceptable.
 - c. Flowmeters: Flange-mounted magnetic type meters are preferred.
 - d. Differential pressure sensors (dry): Multi-range dry sensor.
 - e. High/Low Duct Static pressure switches: Adjustable automatic software reset type.
 - f. Low temperature sensors: Adjustable automatic software reset type.
 - g. Room Temperature sensors:
 - i. Hardwired type. Wireless Room Temperature sensors are not acceptable
 - h. Room thermostats: Acceptable for entry way cabinet unit heaters and unoccupied space unit heaters.
 - i. Control valves: Ball type valves preferred.
 - j. Natural gas consumption monitoring: Pulse type gas meter output to BAS.
 - k. Water consumption monitoring: Water meter output to BAS. Flange-mounted magnetic type meters are preferred.
 - l. Electric consumption and demand monitoring: Pulse type output from electrical meter is not acceptable.
 - m. Snow/Ice Sensors: flush-mount in snowmelt slab; measures slab temperature, sensor surface temperature, and sensor surface moisture level.
3. Execution
- a. All occupant adjustable set point dials should be disabled through software before building turn over.

SECTION 25 90 00 – SEQUENCES OF OPERATION

Section includes: Guidance for SCF-preferred operating sequences and strategies

- 1. Design Requirements
 - a. Sequences of operation shall include programming comments written within code are required unless the sequence is simple and routine.
- 2. Products
 - a. AHU sequences:
 - i. Volcano/Ash/Wildfire Mode: Include this mode for all equipment utilizing outside air. This mode closes all intake and relief dampers in the event of high outdoor air particulate concentration to prevent intake of pollutants into the building.
 - ii. Low temperature AHU shutdown:

- I. Low temperature sensors shall be hardwired to the BAS via a digital input point.
 - II. Upon trip, the fan system shall automatically try up to 5 restarts. Upon tripping a 6th time, the system will be locked out via software until a manual software reset is done.
 - III. The lockout event will cause a pop-up alarm to occur at a monitored location.
 - IV. Reset the trip/restart counter every day at midnight.
- b. Zone Temperature Setpoints:
- i. Night Setback: All zones to reset to a night setback temperature of 65°F (heating) and 80°F (cooling).
 - ii. Night Warmup (heating mode):
 - I. Initiated when any zone falls below 60°F.
 - II. Warmup is disabled when all zones are above 65°F.
 - iii. Morning Warmup: Set all zones to day mode.
 - iv. Morning Cool Down: Not Used
 - v. Occupied Setpoints: Limit Setpoint dials range to 68 to 74°F.
 - I. Set Sensors without local setpoint adjustment that serve entry ways and storage spaces as follows:
 - a) Occupied Cooling – 85°F
 - b) Occupied Heating – 65°F
 - II. Set Sensors without local setpoint adjustment that serve hallways and restrooms as follows:
 - a) Occupied Cooling – 75°F
 - b) Occupied Heating - 68°F
- c. Zone Temperature Monitoring:
- i. Alarm Room sensors below 58°F and above 82°F.
 - ii. Alarm Entry way and other spaces with exposure to outside air below 55°F.
- d. Filter Monitoring: Monitor the differential pressure across each set of filters via an analog sensor.
- e. System Pressure Monitoring: Monitor the system pressure of all hydronic systems and separate glycol heating systems.
- f. Pump and fan monitoring: Monitor status of pump or fans via a current sensor if constant speed or via the VSD if variable speed.

- g. Room Pressure Monitoring: Provide monitoring and alarming of required pressure relationships for spaces such as isolation rooms, nitrous use, or pharmacies. Refer to FGI/ASHRAE 170 for pressure requirements.
- h. Boiler Control: Use boiler packaged controls for all boiler firing and staging functions, with the ability to control temperature setpoint via the BAS using hardwire if possible, or through a gateway if necessary. Monitor boiler firing and boiler fault/alarm to BAS.
- i. Electric Heat Trace: Time of year operation schedule preferred; i.e. turn on end of October, turn off end of April.
- j. Lift Station Monitoring: Provide pump status, high level alarm, general alarm, and pump seal failure alarm connections to the BAS.
- k. Snowmelt: Evaluate the level of controls needed on a case-by-case basis. Default is **Automatic per Snowfall with Idle**.

Controls	Notes
Manual seasonal (idle)	Simplest control, highest operating cost
Manual per snowfall (no idle)	Snow can accumulate on slab during beginning of snowfall until the slab heats up. May forget to turn off after melting is complete.
Automatic per outside air temperature range (5-38F) (partial idle)	Most snowfall occurs within a range of temperatures. Idling is eliminated at extreme cold temperatures.
Automatic per snowfall (no idle)	Snow/ice sensor required
Automatic per snowfall (idle)	Includes snow/ice sensor, automatic seasonal and warm weather shutdown
Automatic per snowfall (with reduced idle)	Reduced idle means keeping slab at dewpoint instead of 33.5°F.

- l. Phase loss or imbalance protection of three phase motors is generally not required.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 26 – ELECTRICAL

SECTION 26 00 00 – ELECTRICAL GENERAL REQUIREMENTS

Section includes: General electrical requirements

1. Design Requirements
 - a. General
 - i. Single electrical service only. Multiple electrical services feeding a single building are not acceptable.
 - ii. Floor mounted electrical equipment shall be installed on housekeeping pads (e.g. pad mounted transformers and switchboards/panelboards).
 - iii. Where room numbers are utilized for documentation or programming, include requirement for Contractor to obtain final room numbering from SCF before programming in the Specifications.
 - iv. Include 20% spare capacity in panelboards. Load branch circuits to no more than 80% capacity. In flush-mount panelboards, provide enough spare conduits to utilize spare capacity.
 - v. New buildings and existing buildings without lightning protection: Perform analysis to determine if lightning protection shall be installed.
 - b. As-Built and Record Drawings
 - i. Ensure that grounding equipment locations are recorded in record drawings. This requirement applies specifically to the main service ground.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 05 19 – WIRE AND CABLE

Section includes: Wire and Cable

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products
 - a. Feeder conductors may be copper or aluminum.
 - b. Branch circuit conductors shall be copper.
 - c. Conductor insulation shall follow standard three-phase color conventions:

	Phase A	Phase B	Phase C	Neutral
480Y/277V	Brown	Orange	Yellow	Gray
208Y120V	Black	Red	Blue	White

3. Execution
 - a. MC cable is acceptable for branch circuit wiring. MC cable may not terminate directly in panelboards. Route hard pipe conduit, type as determined by application, between panelboard and the vicinity of last device served. MC cable length between last device and junction box transition to hard pipe conduit shall be no greater than 25 ft.

SECTION 26 05 26 – GROUNDING

Section includes: Grounding requirements

1. Design Requirements
 - a. Service Grounding
 - i. Create an equipotential plane for the grounding system at the service entrance equipment by connecting the service entrance ground bus to applicable grounding electrodes listed in NEC article 250.
 - b. Telecommunications System Grounding and Bonding
 - i. Connect the telecommunications main grounding busbar (TMGB) to the service ground.
 - ii. Connect each telecommunications grounding busbar (TGB) to building steel.
 - iii. Bond telecommunication equipment chassis, ladder racks, cable trays, conduits, equipment frames, cabinets, and other metallic components to a local TGB or TMGB. Each piece of equipment shall be connected back to the local TGB or TMGB in a radial configuration,

- i.e., equipment ground connections shall not be "daisy chained" and then connected to TGB.
- iv. Telecom rooms shall have static dissipative flooring bonded to the TGB or TMGB in the same room.
- c. Equipment Ground
 - i. Include a separate equipment grounding conductor for each feeder and branch circuit.
 - ii. Refeed existing feeders and branch circuits that do not have an existing equipment grounding conductor.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 05 29 – HANGERS AND SUPPORTS

Section includes: Hangers, Supports, and Penetrations

- 1. Design Requirements
 - a. Hangers and Supports
 - i. Comply with seismic design required under other divisions where applicable.
 - b. Wall and Floor Penetrations
 - i. Penetrations shall be sealed to maintain the rating of the wall or floor assembly which they penetrate.
 - ii. Above ceiling penetrations in full height walls shall be sealed with acoustical filler to maintain the sound attenuating characteristics of the wall.
 - iii. On exterior walls and in areas where pipe leak/failure could result in water damage to adjacent spaces, a water seal system for penetrations is required.
 - iv. Coordinate roof penetrations with Division 7 as an integral part of the roofing system.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 05 36 – CABLE TRAY

Section includes: Cable Tray

- 1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Clearances
 - i. 12 inches above
 - ii. 3 inches below
 - iii. 6 inches to all sides
 - b. Provide cable tray in accessible areas only. Use conduit sleeves in inaccessible areas to connect sections of cable tray.
 - c. Cable tray shall be electrically continuous and UL classified as an equipment grounding conductor. Where cables traverse non-continuous sections of cable tray those sections shall be bonded together with an equipment grounding conductor.

SECTION 26 05 33 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

Section includes: Pull and Junction Boxes, Outlet Boxes, Conduit, Surface Mounted Raceway.

1. Design Requirements
 - a. Extension rings are not acceptable on new boxes.
 - b. Telecommunications pull boxes shall conform to BICSI standard.
 - c. Floor box covers shall be flush with finished floor except in carpeted areas where a flange is acceptable.
 - d. Pre-wired multi- outlet strips are not acceptable.
 - e. In-grade pull and junction boxes shall be of precast concrete construction and shall conform to Municipality of Anchorage Standard Specifications (MASS) division 80. Junction box type shall be selected as required by application (Type 1A, Type 2, etc....).
 - f. In grade junction boxes shall have traffic rated lids.
 - g. Provide Liquid Tight Flexible Metal Conduit when flexible conduit is required.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Floor-mounted conduit is not acceptable. This requirement applies to mechanical, electrical and service spaces specifically.
 - b. Provide dedicated in grade power and telecom conduit stub outs to exterior of building for future use. Future stub outs shall be spaced at approximately 50 ft. intervals on all exterior sides of the building. Cap and tag stub outs with termination location (e.g., "Main Electrical Room").

- c. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

SECTION 26 05 53 – ELECTRICAL IDENTIFICATION

Section includes: Electrical Equipment Labeling

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Equipment Labels and Nameplates
 - i. Rigid engraved labels and nameplates of 1/16-inch-thick laminated plastic.
 - ii. Fastened with threaded fasteners or pop rivets. Adhesive attachment not acceptable.
 - b. Label and Nameplate Color
 - i. Normal Equipment: White letters on a black or gray background.
 - ii. Emergency Equipment: White letters on a red background.
 - iii. Standby Equipment: Black letters on a yellow background.
 - c. Label and Nameplate Text Size
 - i. 1 inch minimum height letters on service disconnect (red background).
 - ii. 1/2 inch minimum height letters on secondary feeder breakers in distribution equipment, special equipment housed in cabinets, panelboards, switchboards, motor control centers, transformers and other electrical equipment.
 - iii. 1/4-inch minimum height letters on disconnects and starters for motors or fixed appliances.
 - iv. 1/8-inch minimum height letters on lighting control relays, dimmer controls and remote lighting control equipment.
 - v. 1/8-inch minimum height, engraved device plates on switches and receptacles where item controlled is not visible from the switch indicating device controlled.
 - vi. 1/8 inch minimum height, adhesive label (black letter on clear background) indicating branch circuit designation (panel and circuit number) on receptacle and light switch device plates, (e.g., "PA-30").
 - d. Junction Box Marking

- i. Junction boxes located in accessible shall have their cover plates marked with circuit number or system using permanent marker.
- e. Color Coding
 - i. Conduits and junction boxes in accessible spaces shall be color coded to identify the system that they house. Use pre-painted product or paint boxes and conduit before installation. Color coding as follows:
 - I. Fire Alarm – Red
 - II. Emergency – Orange
 - III. Standby – Yellow
 - IV. BAS – Blue
- f. Electrical Room
 - i. Provide panel locator map for each level in the electrical room door located on that level.
 - ii. Provide framed building one-line diagram in main electrical room.
- g. Arc Flash
 - i. Provide detailed arc flash label on electrical equipment (Switchboards, Distribution Panels, Panelboards, Transformers, etc.) in accordance with NFPA 70E. Detailed label shall include flash boundaries, PPE levels, shock hazard level and approach boundaries.

SECTION 26 08 00 – COMMISSIONING OF ELECTRICAL SYSTEMS

Section Includes: Recommended level of commissioning for electrical equipment and systems.

- 4. Design Requirements
 - a. Recommended systems to commission
 - i. Administrative office type occupancies: Level 1 Basic Commissioning.
 - ii. Laboratory type occupancies: Level 2 Comprehensive Commissioning.
 - b. Electrical equipment and systems to commission:
 - i. Generator and automatic transfer switches (ATSs).
 - ii. Lighting controls (including interface with other systems such as motor operated windows, A/V equipment, etc.).
 - iii. Access control system (including door lockdown).
 - iv. Power outage test: Proper operation of systems on generator/battery power and proper operation on return to normal power. Systems

include but are not limited to the following: phone system, mechanical systems, fire systems, emergency lighting, BAS, elevators, etc.

- v. Other systems as identified by SCF during project scoping.
- 5. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 6. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 09 13 – ELECTRICAL POWER MONITORING

Section includes: Electrical Power Monitoring.

- 1. Design Requirements
 - a. Provide power meter in main switchboard.
 - b. Electrical monitoring shall be compatible with the current SCF BAS standards. Pulse type electrical metering is not acceptable.
 - c. No phase loss protection/monitoring is required except by approval on a case by case basis.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution
 - a. Include power monitor programming and verification in design requirements.
 - b. Provide BAS programming necessary to interface with the energy metering (EMC) program.

SECTION 26 09 23 – LIGHTING CONTROLS

Section includes: Lighting Controls.

- 1. Design Requirements
 - a. Ceiling-mounted occupancy sensors are preferred in rooms with a normal occupancy greater than 2 people. Provide wall occupancy sensors in small rooms such as offices and storage closets.
 - b. Dimming to be provided in normally occupied spaces, including but not limited to patient rooms, offices, and conference rooms.
 - c. Coordinate with SCF regarding location of dimming controls in shared patient spaces.
 - d. Daylight harvesting should be considered on a project by project basis.
- 2. Products
 - a. Building lighting controls
 - i. Cree Lighting
 - ii. NX Controls

- iii. No substitutions allowed.
- b. Exterior lighting
 - i. Lighting control panel with photocell
- 3. Execution
 - a. In small office spaces and spaces that are not normally occupied (e.g. Janitor closet, storage room, etc.), install occupancy sensor/switch that requires manual operation to turn lights on and turns lights off automatically after a preset delay when space is vacated.
 - b. In restrooms install occupancy sensor(s). Locate such that toilet stalls are within coverage zone. Sensor shall turn lights on automatically upon occupancy and off automatically after a preset delay when space is vacated. Utilize dual technology type sensors.

SECTION 26 22 13 – LOW VOLTAGE TRANSFORMERS

Section includes: Secondary transformers.

- 1. Design Requirements
 - a. 15 to 50kVA: 45dB
 - b. 51 to 150kVA: 50dB
 - c. 151 to 300kVA: 55dB
 - d. 301 to 500kVA: 60dB
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution
 - a. Ground transformer wye secondary as a separately derived system.
 - b. Mount on 3-inch minimum housekeeping pad.

SECTION 26 24 13 – SWITCHBOARDS

Section includes: Switchboards.

- 1. Design Requirements
 - a. In existing facilities, new equipment to be of the same manufacturer as the existing equipment.
 - b. Provide Surge Protective Device (SPD) factory installed in panelboards where required. Remote mounted SPDs are not acceptable.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Installation

- a. Mount switchboards on 3-inch minimum housekeeping pad with minimum 2-inch reveal on front and sides.
- b. Indicate clearances dictated by NEC Article 110 by two inches wide bright colored (red or yellow) striping on the floor. On the floor immediately inside the striping, stencil in two inch block letters the statement: "ELECTRICAL CLEARANCE – STORAGE ILLEGAL INSIDE THIS ZONE."

SECTION 26 24 16 – PANELBOARDS

Section includes: Panelboards.

1. Design Requirements
 - a. In existing facilities, new equipment to be of the same manufacturer as the existing equipment.
 - b. Provide Surge Protective Devices (SPDs) factory installed in panelboards where required. Remote mounted SPDs are not acceptable.
 - c. Panelboards shall accept bolt on breakers only, plug in breakers are not acceptable.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Surface mount panelboards in electrical rooms.
 - b. Panelboards shall be located in electrical rooms when possible. Flush mounted panelboards in corridors are acceptable.

SECTION 26 24 19 – MOTOR CONTROL CENTERS

Section includes: Motor Control Centers.

1. Design Requirements
 - a. Do not use motor control centers. Feed motor loads from a panel dedicated to mechanical loads. Locate motor starter/disconnect or controller as noted in section 26 2913.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 25 00 – FEEDER AND PLUG-IN BUSWAY

Section includes: Feeder and Plug-In Busway.

1. Design Requirements

- a. Busway shall be totally enclosed.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 26 16 – ENCLOSED CONTACTORS

Section includes: Enclosed Contactors.

1. Design Requirements
 - a. Do not use contactors for branch circuit on/off control. Provide RIB devices for branch circuit control instead.
 - b. Verify acceptable applications for contactors with SCF Facilities Maintenance and Operations.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 27 26 – WIRING DEVICES

Section includes: Wiring Devices.

1. Design Requirements
 - a. Device Characteristics
 - i. Devices shall be heavy duty commercial grade.
 - ii. Devices shall be rated for 20 amps. Devices rated for 15 A are not acceptable.
 - iii. Device Color:
 - I. White for devices fed by normal circuits
 - II. Red for devices fed by optional standby or emergency circuits
 - iv. Device plates shall be stainless steel.
 - v. Provide spare cover plates for floor boxes. Quantity not less than 20 percent of total floor boxes installed.
 - vi. Provide devices with integral USB charger in public use areas. Coordinate exact quantities and placement with the Owner during the Design Development Phase.
 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
 3. Execution
 - a. Install light switches on the strike side of the door.
 - b. Provide receptacles on minimum of 3 walls in office spaces, coordinate location with furniture layout whenever possible.

- c. Headbolt Heater receptacles
 - i. Headbolt heater receptacles should be limited to SCF vehicle parking spaces only. Covers should be lockable when not in use.
 - ii. In areas where the cost of electricity is above 25c/kwh, receptacles for headbolt heaters should be controlled to limit power usage.
- d. Provide light switches with pilot light in mechanical and electrical spaces.
- e. Corridor receptacles shall be on a separate circuit from adjacent spaces.
- f. Receptacles in corridors shall be spaced at minimum every 30 feet.
- g. Provide minimum one weatherproof receptacle on each exterior side of the building on a dedicated circuit.
- h. Provide a dedicated 50 amp twist lock receptacle in large public spaces for connection to portable event equipment.
- i. Coordinate with Architectural on locations of alcohol based hand sanitizers related to switches/outlet locations
- j. In areas with ligature resistant outlets and devices, provide remote shutoff of these devices in local administrative area. Shutoff shall be labelled for the room(s) they shut off.
- k. Coordinate with SCF on tamper proof outlet locations in spaces that may change to an occupancy that requires tamper proof outlets. Some examples are consulting rooms that could become exam rooms, or waiting rooms that may change to lobbies that serve children.

SECTION 26 27 43 – ELECTRIC VEHICLE CHARGING STATIONS

Section includes: Electric vehicle charging stations

- 1. Design Requirements
 - a. Coordinate providing EV charging stations with SCF on new facility projects or major parking area remodels. Where EV charging stations are provided, level 2 chargers should be provided.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 28 16 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

Section includes: Enclosed Switches and Circuit Breakers.

- 1. Design Requirements
 - a. In existing facilities, new equipment to be of the same manufacturer as the existing equipment.

- b. Mount Main Service Disconnect on exterior of building. Shunt trip main disconnect not acceptable.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 29 13 – MOTOR STARTERS AND CONTROLLERS

Section includes: Motor Starters and Controllers.

4. Design Requirements
 - a. Motor starters shall have adjustable solid state overload relays. Melting alloy and bimetallic overload relays are unacceptable
 - b. Motor starters shall have a red LED running pilot light and Hand-Off-Auto switch mounted on the enclosure.
5. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
6. Execution
 - a. Locate motor starters at location of equipment served when possible. Otherwise wall mount near equipment.

SECTION 26 32 13 – ENGINE GENERATORS

Section includes: Emergency and Standby Engine Generators.

1. Design Requirements
 - a. Generators shall be compression ignition type. Turbine or other types not acceptable.
 - b. Engines with special fuel requirements are not acceptable. Engine shall obtain rated output with No. 1 or No. 2 diesel or heating fuel.
 - c. Mount generator on suitable full length sub-base with seismically restrained spring-type vibration isolators between the sub-base and the floor.
 - d. Exterior generator installations shall be housed in a heated and ventilated insulated weatherproof walk-in enclosure. Enclosure shall have a minimum 3 foot interior clearance around generator for maintenance access.
 - e. Exterior generator housing shall be sound attenuating such that when measured at 7 meters from the set operating at full load in any direction, the sound level is less than 65dBa.
 - f. Provide a generator remote annunciator.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution

- a. Generators shall not be installed in basements or in any location that is below grade.
- b. Mount generator remote annunciator in fire department entry adjacent to fire alarm annunciator.
 - i. Provide hardwired connection to the Building Automation System for annunciation generator running status and fault status.
- c. Locate generator inside of the building when possible. Where that is not possible, coordinate location with SCF maintenance department.

SECTION 26 33 53 – STATIC UNINTERRUPTIBLE POWER SUPPLY

Section includes: Static Uninterruptible Power Supplies.

1. Design Requirements
 - a. Coordinate equipment characteristics with SCF IT department.
 - b. Division 26 contractor to install hard wired power feed to rack mount UPSs. Rack mount UPSs are typically OFOI equipment.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Install UPS in a readily accessible location.
 - b. Units with weights exceeding 50 lbs shall not be installed in ceiling areas.

SECTION 26 36 23 – AUTOMATIC TRANSFER SWITCHES

Section includes: Automatic Transfer Switches

1. Design Requirements
 - a. Switch shall be electrically operated and mechanically held.
 - b. Transfer switch shall have an integral control panel on the front of the switch enclosure.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Transfer switch positions shall be monitored on the remote generator annunciator panel.

SECTION 26 41 13 – LIGHTNING PROTECTION

Section includes: Lightning protection

1. Design Requirements
 - a. Evaluate if lightning protection is required

2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 43 13 – SURGE PROTECTION DEVICES

1. Design Requirements
 - a. Provide surge protection devices on main distribution panelboard.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 51 00 – INTERIOR LIGHTING

Section includes: Interior Lighting Fixtures and Lamps.

1. Design Requirements
 - a. Fixtures shall be commercial grade.
 - b. LED fixtures shall be used where possible.
 - c. Track lighting shall be fed from a single circuit.
 - d. Lighting in offices, patient spaces, and meeting spaces to be minimum 90 CRI. Lighting in all other spaces to be a minimum 80 CRI.
 - i. Lighting in dental spaces shall have a Fidelity Index (Rf) over 95
 - e. Adhere to IES lighting standards for accurate illumination levels
 - f. Provide tunable lighting in clinical spaces such as exam rooms and dental rooms.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution
 - a. Provide lighting on standby circuits in public spaces when standby power is available.
 - b. Light fixtures in service spaces shall be chain hung or surface mounted. Rigid pendants not acceptable.
 - c. Coordinate with SCF for control zones of fixtures, and provide a lighting control sequence for SCF review before the 95% design submittal.
 - d. Provide daylight panels/light glass in interior spaces without windows where people spend a lot of time, for example offices and exam rooms.
 - e. Controls
 - i. Coordinate with SCF for per program and per space needs.

SECTION 26 52 00 – EMERGENCY LIGHTING

Section includes: Interior Lighting Fixtures and Lamps.

1. Design Requirements
 - a. When an NEC Article 700 emergency generator is available, emergency lighting shall be provided by fixtures that also provide normal lighting for the building and shall be supplied from the generator via a UL924 listed device.
 - b. In facilities larger than 10,000 ft², use a central battery inverter to achieve required emergency lighting levels when an emergency generator is not available to achieve required emergency lighting levels.
 - c. In facilities smaller than 10,000 ft², use integral battery ballasts/inverter drivers in select fixtures when an emergency generator is not available to achieve required emergency lighting levels.
 - d. Provide battery powered Emergency Lighting Units (ELUs) in mechanical and electrical spaces. Avoid the use of ELUs in public spaces unless approved by SCF.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 26 56 00 – EXTERIOR LIGHTING

Section includes: Exterior Lighting Fixtures.

1. Design Requirements
 - a. Exterior fixture light source shall be LED, no exceptions. Housing shall be a smooth form factor with minimal cross sectional area. Shoebox style fixtures are not allowed.
 - b. Provide pedestrian scale fixtures and poles for pedestrian only areas and vehicular scale fixtures and poles for vehicular and parking areas.
 - c. Exterior fixtures shall be rated to -40°F.
 - d. Exterior fixtures, supports and pole assemblies shall be capable of withstanding 100 mph winds with gusts to 130 mph with no damage unless more stringent requirements must be used for a given site.
 - e. Provide square aluminum poles.
 - f. Provide pile driven or poured concrete base for pole mounted fixtures. Coordinate with Civil and Structural to determine appropriate base type for the soil conditions.
 - g. Fixture and pole finish: Dark Bronze.

- h. Exterior fixtures shall typically be controlled via photocell. The preference is for all exterior lights at a facility to come on at once and not do zoned photocell controls. The exception to this is larger campuses or properties with multiple parking lots where there is a distinct visual cutoff between two zones.
 - i. All exterior lighting to meet IES lighting requirements.
 - j. Submit an exterior lighting calc package to SCF at the 65% and 95% design deliverables.
 - k. Signage lighting – coordinate with Architect for all signage lighting. Use additional details or cross references between Architectural and Electrical sheets as appropriate. SCF has previously had projects where sign lighting is not coordinated between sheets resulting in poor illumination.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 27 – COMMUNICATIONS

SECTION 27 10 00 – STRUCTURED CABLING

Section includes: Technical requirements of the structured cabling system including extended warranty, horizontal telecom cable, horizontal telecom cable patch panels, horizontal telecom cable outlets, backbone fiber optic cabling, fiber optic cabling terminations, fiber optic cable patch cords, telecom racks, telecom room flooring, and telecom room wall mounted plywood.

1. Design Requirements

- a. Conduit Placement: wires that pass-through walls, ceilings, or floors need to go through conduit
- b. Horizontal telecom cable:
 - i. Category rating: Category 6
 - I. Category 6A should be considered for specific use cases where additional performance is needed (higher bandwidth, such as PACS or APs that might have multi gig bandwidth needs beyond the Cat6 standard).
 - ii. Designer to verify plenum rated cables are submitted and installed in plenum spaces.
- c. Telecom cable patch cords:
 - i. Provide patch cords of the same manufacturer as that which provides the telecom horizontal cabling.
 - ii. Patch cords should be as short as possible for the application. Contractors should not default to set lengths such as 3ft cords that result in cluttered installation.
- d. Horizontal telecom cable patch panels:
 - i. General: Straight patch panels are preferred. Angled patch panels are not desired.
 - ii. Provide patch panels of the same manufacturer as that which provides the telecom horizontal cabling or from a manufacturer partnered with the cable manufacturer and able to offer the structured cable system warranty.
- e. Horizontal telecom outlets:
 - i. Provide telecom outlets of the same manufacturer as that which provides the telecom horizontal cabling or from a manufacturer partnered with the cable manufacturer and able to offer the structured cable system warranty.
- f. Backbone fiber optic cabling:

- i. Types:
 - I. Fiber shall typically be singlemode cable. Multimode is acceptable where a specific use is identified.
 - II. Indoor:
 - a) Multimode – 50 micron, OM4+
 - b) Singlemode – 8.3 micron, OS2
 - III. Outdoor/Indoor:
 - a) Multimode – 50 micron, OM4+
 - b) Singlemode – 8.3 micron, OS2
- g. Fiber optic connectors – Provide patch panels to house fiber optic cable connectors in the telecom rooms.
 - i. Multi-mode
 - I. LC-UPC type, field terminated cam style
 - ii. Single-mode
 - I. LC-UPC type, fusion spliced, factory terminated "pigtail" connectors
- h. Fiber Optic Cable Patch Cords:
 - i. Patches should match the runs they are connecting, without being mixed (cannot/should not use an OM4 patch on OM2 run for example)
- i. Fiber Optic Cable Patch Panels:
 - i. Provide patch panels to fully terminate fiber optic cables strands
 - ii. End-to-end terminated fiber runs should include test results from contractor to validate installation and have clear labels that indicate the remote patch panel(s) from a panel, whether 1:1 or 1:m, should include remote location, terminated fiber distance (per test results) and summary of capacity/type of each run in the patch panel.
 - I. Tests to be shared with SCF ITS Network team for documentation.
- j. Telecom racks:
 - i. General: Provide industry standard nineteen inch, black, two post telecom racks with cable management.
- k. Telecom room flooring:
 - i. Anti-static flooring is recommended.
 - ii. Coordinate with SCF on a per project basis for telecom flooring if it does not meet preference above.

- I. Telecom room wall mounted plywood:
 - i. Size: Type AC, 4 foot by 8 foot by $\frac{3}{4}$ inch.
- m. UPS – Eaton
 - i. Cabinet – device dependent – coordinate with IT
 - ii. Small comm rooms – in rack
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 27 05 36 – CABLE TRAYS

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products
 - a. Provide ladder-style trays in telecom rooms.
 - b. In larger comm rooms, provide dedicated 4-inch cable trays for fiber between the fiber patch panel and the racks/cabinets, as needed (e.g., VNPCC and Data Centers).
 - c. Provide basket-style trays in all other spaces.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 27 11 00 – COMMUNICATIONS EQUIPMENT ROOM

1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
2. Products
 - a. Each level of all occupied buildings will have at least one telecommunications room. The MDF shall be on the ground floor and serve as the building service entrance. IDFs will be located on each additional floor. The MDF will be connected to each Satellite Hub Room (IDF) with single mode fiber where IDFs are required.
 - i. See *Backbone Fiber Optic Cabling* standards above.
 - b. Size and Quantity: The minimum size requirement for the MDF is 100 ft² per 300 circuits up to 150 ft² for up to 600 circuits
 - i. Where individual cable runs exceed the maximum length of 90 meters, an additional(s) IDF will be required.
 - ii. Rooms should be 'stackable' locations on floor design
 - c. Power requirements:
 - i. MDF and IDF: Install a UPS sized for 4 hours of backup power to equipment.

- ii. Data Centers: should include generator, power, and ATS.
 - d. HVAC Capacity: Provide cooling based on heat generation of equipment planned, coordinate with SCF IT for planned equipment and future capacity requirements. HVAC for telecom rooms shall be on generator when telecom equipment is on the generator.
 - e. Fire suppression system: Provide clean agent fire suppression system in data centers and large telecom rooms. Coordinate requirements with SCF IT.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 27 41 00 – AUDIO-VIDEO COMMUNICATIONS

Section includes: Technical requirements of the audio-video systems.

- 1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 2. Products
 - a. Projectors
 - i. Owner Furnished
 - b. Video Conferencing
 - i. Owner Furnished
 - c. Equipment Characteristics
 - i. Use ceiling-mounted speakers for sound distribution based on program needs.
 - ii. Obtain equipment list from SCF during the Design Development phase.
 - I. Equipment list is dependent on program, coordinate with program and IT during design
 - d. Conference Rooms
 - i. Coordinate with SCF for each conference room
 - ii. Conference tables should have connections to TV locations, minimum 1¼-inch conduit between any conference table floor box and behind TV wall location.
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 27 51 19 – SOUND MASKING

- 1. Design Requirements (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 2. Products

- a. SCF generally prefers architectural solutions to mitigate noise propagation whenever possible.
 - i. Designers should prioritize the use of acoustical panels, full-height walls, and other architectural interventions to address noise concerns.
 - b. When electronic sound masking is necessary, designers should select high-quality sound masking systems that generate pink noise and ensure large coverage areas to minimize the noticeable transition between spaces with and without sound masking.
 - i. This approach helps reduce user disruption and creates a more consistent and comfortable auditory environment.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

SECTION 28 13 00 – ACCESS CONTROL

Section includes: Access Control System (ACS) panels, ACS card readers, and ACS wiring

1. Design Requirements
 - a. ACS panels:
 - i. Manufacturer
 - I. Lenel OnGuard
 - II. Or pre-approved equal
 - ii. Panel locations:
 - I. Main control panels shall be located in telecom rooms.
 - II. Individual door controllers should be located above the accessible ceiling on the secure side of applicable doors.
 - b. ACS card readers:
 - i. Card Readers
 - I. Technology: Typically proximity based card readers, compatible with the Lenel OnGuard system.
 - II. SCF has not standardized on a specific card reader, but the designer should coordinate with SCF IT during design to understand integration requirements and user preferences.
 - ii. Card reader locations: Coordinate locations of card readers with SCF on a per project basis, typical locations for desired card readers are –
 - I. Exterior Doors
 - II. Comm Rooms
 - III. Clean/Dirty utility rooms
 - IV. Clinic access from public spaces
 - c. ACS wiring: As recommended by the manufacturer.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 28 23 10 – VIDEO SURVEILLANCE

Section includes: Video Management System software, indoor CCTV cameras, outdoor CCTV cameras, CCTV cabling, exterior CCTV housings, Network Video Recording System (NVRS) server, and NVRS UPS.

1. Design Requirements

- a. Video Management System:
 - i. Manufacturer
 - I. Avigilon
- b. Hardware
 - i. Indoor CCTV camera – Manufacturer:
 - I. Avigilon preferred, cameras to be compatible with Avigilon system
 - ii. Outdoor CCTV camera – Manufacturer:
 - I. Avigilon preferred, cameras to be compatible with Avigilon system
 - iii. CCTV cabling: Provided in accordance with 27 10 00.
 - iv. Exterior CCTV camera housing
 - I. Exterior, weatherproof, heated enclosure from the camera manufacturer
 - v. NVRS network switches
 - I. Owner Furnished, Owner installed. Contractor responsible for patching, racks, patch panels
- c. Camera locations:
 - i. Camera locations shall be coordinated with SCF IT Services, SCF Facilities, and SCF Quality Assurance on a project-by-project basis.
 - ii. Generally, cameras should cover entries, exits, and high value areas, while respecting patient privacy. Specific locations to consider cameras are:
 - I. Each main entry/exit.
 - II. Garages
 - a) Position cameras at exits of garages to capture license plates.
 - III. Safety areas
 - IV. Supply rooms
 - V. Cover corners of the building on exterior
 - iii. Some areas, such as detox facilities and crisis stabilization facilities, require special care to protect patient privacy and should be coordinated early in the design process.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 28 31 00 – FIRE DETECTION AND ALARM

Section includes: Fire alarm system panel(s), fire alarm system addressable detectors, fire alarm system wiring, and fire alarm system programming

1. Design Requirements

a. Fire alarm system controller

i. Manufacturer:

- I. Edwards System EST4 preferred
- II. Or approved equal.

ii. Panel locations:

- I. Fire alarm control panel to be located in main telecom room.
- II. Fire alarm annunciator in main entry vestibules.

b. Exit Signs:

- i. Exit signs should generally be edge lit exit signs or similar in regularly occupied or public facing facilities. Plastic exit signs should only be used in facilities that are not public facing and may be subject to damage such as maintenance facilities or storage facilities.
- ii. Exit sign lettering should be green.

c. Fire alarm system detectors

i. Multi-sensor detector

- I. Preferred detector type where automatic detection is required and detection technology is appropriate.

ii. Fixed temperature heat detector

- I. Provide where automatic detection is required and environmental conditions or required detection technology prohibit multi-sensor detector.

iii. Photoelectric smoke detector

- I. Provide where automatic detection is required and environmental conditions or required detection technology prohibit multi-sensor detector.

iv. Duct detector

- I. Air sampling duct detector housing with addressable photoelectric smoke detector.
- II. Provide remote test station in readily accessible location.

v. Housings

- I. Housings should be white with red lettering.

- d. Fire alarm system modules
 - i. Monitor/Input Module
 - I. Converts contact closures at fans, dampers, doors, etc., to digital information for evaluation and alarm.
 - ii. Waterflow/Tamper Modules
 - I. Converts normally open waterflow contacts and supervisory tamper contacts to digital information for evaluation and alarm.
- e. Fire alarm system manual pull stations
 - i. Double action.
 - ii. Pull stations should have protective shields
- f. Fire alarm system notification appliances
 - i. Indoor horn/strobes or strobes:
 - I. Candela rating per NFPA 72 requirements
 - ii. Outdoor horn/strobes
 - I. Candela rating per NFPA 72 requirements
 - II. Operating environment from -31 to 150°F
 - iii. Sprinkler bell
 - I. 10-inch Vibrating, Diode
 - II. Supply via non-silenceable supervised notification circuit
 - iv. Booster power supplies
 - I. As required for the installation
- g. Fire alarm system wiring
 - i. Voltage drop shall not exceed 10% at the most distant device in a circuit
 - ii. Circuits shall be sized to accommodate 20% spare capacity
- h. Fire alarm system programming
 - i. Provide reporting functionality of alarm or trouble condition back to the monitoring system.
 - ii. Coordination with IT Services for land lines (POTS lines) for emergency dialing if specified.
 - iii. Dial out/emergency out communications should be radio where possible. Coordinate with SCF if using an alternate communications method.

- I. Contractor should test radio signal levels before occupancy and provide the results of this test to the owner.
2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 31 – EARTHWORK

All earthwork is subject to SCF Review

SECTION 31 00 00 – EARTHWORK GENERAL REQUIREMENTS

Includes: Erosion and sedimentation control, selective site demolition, site clearing, maintenance, repair, rehabilitation, replacement, restoration, preservation, etc. of earthwork.

1. Design Requirements

- a. Site clearing shall be minimized to the extent possible.
- b. Clearing and grubbing shall include removing trees, shrubs, grass and other vegetation, improvements, or obstructions required to permit installation of new construction.
 - i. Completely remove stumps, roots, and other debris protruding through the ground surface.
 - ii. Use only hand methods for inside drip line of trees indicated to remain.
- c. Site Salvage:
 - i. All demolished material shall be offered to the Owner. If not desired by the Owner, materials shall become property to be removed from site and disposed of by the Contractor at his expense unless noted otherwise on the Drawings.
- d. No contaminated material or construction debris may be wasted on-site.
- e. The consultant shall include specifications:
 - i. Provide dust control and cleanup on any roadway that the contractor uses.
 - ii. Require the contractor to immediately cleanup and sediment or debris that escapes the project site.
- f. The consultant shall include an Erosion and Sediment Control specification in all projects to ensure contractors abide by the general Alaska Pollutant Discharge Elimination System (APDES) permit. If required by the APDES permit, the specification will require at least a Notice of Intent (NOI) and possibly a full Storm Water Pollution Prevention Plan (SWPPP) to be submitted to the Alaska DEC. It will be the contractor's responsibility to pay for the permit application.

2. Products

- a. Municipality of Anchorage: Most current edition of MASS.

- b. Mat-Su Borough: Most current edition of Matanuska-Susitna Borough Standard Modification Documents.
 - c. Other communities without standard specifications: Product specifications for earthwork shall conform to the most current edition of the Alaska Department of Transportation and Public Facilities Standard Specification for Highway Construction or per the engineer's geotechnical report.
3. Execution
- a. Municipality of Anchorage: Most current edition of MASS.
 - b. Mat-Su Borough: Most current edition of Matanuska-Susitna Borough Standard Modification Documents.
 - c. Other communities without standard specifications: Per to the most current edition of the Alaska Department of Transportation and Public Facilities Standard Specification for Highway Construction.

SECTION 31 20 00 – PLANT PROTECTION AND SALVAGING

Section includes: Protecting of existing vegetation that is affected by execution of the Work, whether temporary or permanent construction and collection of materials for reuse.

- 1. Design Requirements
 - a. Engage a qualified Arborist to direct plant-protection measures near trees, shrubs, and other vegetation indicated to remain.
 - b. Engage a qualified Arborist to direct plant salvage work for trees, shrubs, and other vegetation indicated to be salvaged.
 - c. No earthwork or grading shall be done within the drip line or identified protection boundary of existing trees that are to be protected and remain.
 - d. A protection fence shall be installed around the entire boundary of vegetation to be protected.
 - e. The protection fence shall be 6 foot chain link fence.
- 2. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)
- 3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

DIVISION 32 – EXTERIOR IMPROVEMENTS

Includes: maintenance, repair, rehabilitation, replacement, restoration, preservation, etc. of exterior improvements.

SECTION 32 00 00 – EXTERIOR IMPROVEMENTS

1. Design Requirements

- a. All roadways shall be designed in accordance with the American Association of State Highway and Transportation Officials, (AASHTO) Standards for local roads.
- b. Roadway and parking lot signs per the Manual of Uniform Traffic Control Devices, Federal Highway Administration with Alaska Supplement.
- c. Vehicle access and circulation:
 - i. Provide curb and gutter and a minimum 2-foot-wide paved shoulder beyond the travel lane. Where practical, design a widened shoulder or separated path for bicycle access and circulation.
- d. Minimum turn radius: verify largest emergency/transit vehicle used in the community.
- e. Grade in the direction of travel: maximum of 5%. Grade transverse to the direction of travel: a minimum of 2% and maximum of 4%.
- f. Design roadway and parking lot structures sufficient to support an AASHTO HS20 or H20 design vehicle.
- g. Vehicle circulation paths and parking: include fire department and emergency vehicle access, maintenance vehicle parking areas, ADA-required accessible routes, ADA-required accessible parking areas, delivery and private vendor access, and user access and parking.
- h. Automobile head-bolt heater outlets when required by SCF
- i. Provide bollards or other physical barriers to protect buildings, tanks, and other structures from vehicle damage. Design bollards at garage doors to be 6 inches narrower than the garage opening.
- j. Pedestrian access and circulation:
 - i. Sidewalks: Minimum width: 6 feet. Preferred width: 8 feet. Separate roadway and sidewalk when practicable by 6 to 10 feet to allow for plantings or snow storage. Snow storage and plantings should not be co-located.
 - ii. All sidewalks to meet ADA. Grade in the direction of travel: maximum of 4.9%. Grade transverse to the direction of travel: a maximum of 1.9%,

- iii. Ski Trails and Bike Paths: Minimum width: 6 feet, 10 feet for skate-ski trails.
- k. Canopies/roofs: Where feasible, provide canopies/roofs at exterior stairs and landings, ramps, and at the landings of building entrances and exits to prevent rain and the accumulation of snow and rain on these structures per applicable codes and OSHA regulations. Direct canopies/roofs runoff away from sidewalks or other pedestrian pathways. Provide a minimum 15-foot x 15-foot area immediately adjacent to the protected area for equipment turnaround. No snow or rain drainage is allowed on pedestrian walkways or parking spaces.
- l. Provide handrails and guardrails on exterior stairwells and walkways as required by applicable codes and OSHA regulations.
- m. Design walkways, hard landscaping, and adjacent facilities for SCF facilities services snow removal operations, snow storage areas, snow throw directions, maneuvering areas for snow removal equipment, and occasional use by maintenance and emergency vehicles.
- n. Design pedestrian access and circulation such that rainwater and snow-melt runoff will shed to a ditch (or other permeable area that will allow conveyance or percolation) storm drain system, or curb and gutter system. Do not place paths in locations that will accumulate ice from dripping snowmelt from building exteriors, or adjacent landscaped areas.
- o. Consider below grade snowmelt systems for ADA parking/access and main pedestrian entry areas. Snowmelt systems may only be used if proper drainage can be provided to avoid icing at the demarcation point between heat and non-heated slab and must be approved by SCF Facilities.
- p. Drainage
 - i. Design all storm water systems to meet EPA and State of Alaska DEC criteria for the most current APDES Permit
 - ii. Do not connect year round water flow sources to the storm drainage systems.
 - iii. Size drainage structures for 50-year design storm.
 - iv. Design to prevent water flow and snow runoff from crossing over pedestrian paths.
 - v. Channel drainage in surface structures to the greatest extent possible to ditches, swales, etc. Structure side slopes: Preferred Maximum 4:1 but in no case greater than 3:1.
 - vi. Grade exterior stair risers to positively drain water to the side unless they have an open structure such as grating. For open type risers,

- grade under the stairs to control drainage to a safe area and the ultimate point of departure. Install curbing or other features to provide positive prevention of drainage flowing onto the stairway from exterior sources.
- vii. Design for positive drainage away from all surface structures that are not intended to receive drainage such as building foundations, manholes, cleanouts, fire hydrants, valve boxes, light poles, junction boxes, conduit, etc.
 - viii. Drainage paths and structures: Include entry and departure points and anticipated magnitudes of flow. Include locations of drainage discharge from the building to the site, including normal and overflow roof drains, foundation drains, and dry wells.
 - ix. Drainage from roof drains shall be directed to an appropriately sized new or existing storm water system or other permeable area that will allow conveyance or percolation. Dry wells for the total roof drain flow are not allowed; consideration may be given for drywells or infiltration systems to receive incidental winter snow melt flow. Locate and design dry wells or infiltration systems to preclude ground saturation within the building foundation structural prism. Drywells shall have a vent and bypass with outfall onto a concrete or stone spillway, graded away from the structure. Infiltrator type drywells are preferred to reduce contamination from impermeable materials.
 - x. Install storm drain manhole to serve roof drain no further than 35 feet from building. Manholes located more than 35 feet from building will require heat trace.
- q. Snow Removal
- i. Consider snow removal procedures, maneuvering requirements, and storage for walkways, roads, drives and parking lots:
 - ii. Roadways and parking areas: Provide snow storage areas readily accessible to, and within 1000 feet of, the area from which snow is removed.
 - iii. Provide snow storage areas adjacent to walkways.
 - iv. Design snow storage area capacity for 2.3 ft³ of packed snow for every 1 ft² of area from which snow is removed.
 - v. Locate snow storage areas to protect structures, roadways, parking lots or walkways from spring snow melting.
 - vi. Provide ramps or drives to all areas requiring snow removal, configure for access by snow removal equipment.

- vii. Do not locate permanent bicycle racks, benches, and other fixed site equipment in areas of mechanized snow removal. Place light poles, raised manholes, transformers, and other similar structures at least 9 feet away from the roadway edge of pavement or face of curb and at least 6 feet away from the edge of sidewalks or walkways.
 - viii. Designate snow storage areas, and design roadways and parking lots to allow efficient removal of snow to those areas without damage to roadway or lot equipment or structures. Construct inside curb curves in street-side parking alcoves with a minimum 20-foot radius to the face of curb. Avoid 'hammerhead' or 'barbell' ends in parking lots.
 - ix. Site design shall be coordinated to emphasize snow removal and storage requirements. Note that the local parking lot and landscape requirements may need to be balanced with SCF maintenance needs.
 - x. Snow storage shall not be collocated with landscaped areas that include trees and/or shrubs.
- r. Locate buried utility with adequate operational and maintenance access and such that future excavation, using OSHA trench safety requirements, will not undermine permanent structures, require removal of substantial trees, or unduly block vehicle or pedestrian access. Design the utilities systems to resist the seasonal structural and thermal forces, i.e. frost jacking, shading, lack of snow cover, traffic loading, etc. Locate and dimension surface facilities to accommodate anticipated snow depth.
- s. Design refuse handling storage and disposal (dumpsters) to minimize visual exposure to the public, and for safe and efficient access by custodians and refuse trucks.
- i. Locate dumpsters to minimize dumpster/pedestrian conflict. In no case may dumpsters be closer to a building than the code allows. Locate dumpsters within 75 ft of buildings when this can be accomplished without forcing pedestrian traffic next to dumpsters.
 - ii. The refuse truck maneuvering space requirements approximate those of an AASHTO Single Unit Truck (SU) design vehicle.
 - iii. Configure the path of refuse delivery to allow efficient snow removal and traction sand application with normal walkway snow removal motorized brush equipment. Where possible, cover a path to prevent snow accumulation.
 - iv. Provide a minimum of 10-foot-wide maintenance access around and adjacent to the entire perimeter of the dumpster unless a screening/enclosure is required by code. Maximum grade 5%.

- v. Provide closures and locking as needed based on possible local wildlife concerns.
2. Products
 - a. Tactile warnings at all ADAAG ramps
 - b. Utility Bollards
 - c. Wheel Stops
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 32 90 00 – PLANTING GENERAL

Section includes: Submittals and inspection requirements for related sections 32 91 00, 32 92 00, 32 93 00, 32 94 00, and 32 97 00; and project options related to minimum specification content.

4. Design Requirements (per individual Division 32 sections)
 - a. For all Alaskan projects, the Municipality of Anchorage Standard Specifications (MASS) establishes minimum specification requirements, with special provisions per this specification section. Each project will identify the specification format to be followed. The following is expected based on project location:
 - i. Municipality of Anchorage: Most current edition of Municipality of Anchorage Standard Specifications (MASS) with special provisions per this document or as recommended by consultant.
 - ii. Mat-Su Borough: Most current edition of Matanuska-Susitna Borough Standard Modification Documents with special provisions per this document or as recommended by consultant.
 - iii. Other communities without standard specifications:
 - I. Option 1: Most current edition of Municipality of Anchorage Standard Specifications (MASS).
 - II. Option 2: Most current edition of the Alaska Department of Transportation and Public Facilities Standard Specification for Highway Construction with special provisions as necessary to achieve an equivalent or greater level of guidance as the Municipality of Anchorage Standard Specifications (MASS).
 - III. Option 3: CSI format specifications as necessary to achieve an equivalent or greater level of guidance as the Municipality of Anchorage Standard Specifications (MASS).
5. Products (per individual Division 32 sections)

6. Execution; the consultant should follow this general process for installations and inspections of Division 32 products and materials, or develop a new one as approved by SCF, including determining which inspections will be required and who shall be in attendance.
 - a. Submittals
 - i. Contractor shall submit the following to the Design Project Manager before beginning installation:
 - ii. Qualification data for:
 - iii. Landscape Contractor
 - iv. Landscape Construction Supervisor
 - v. Arborist
 - vi. Planting Soil Manufacturer
 - vii. Proof of Alaska certification for handling of pesticides/herbicides
 - b. Product data – for each specified product
 - c. Associated product certifications
 - i. Seed
 - ii. Limestone and Fertilizer
 - iii. Manufacturer's certified analysis of standard products
 - d. Product sources
 - i. The Contractor shall notify the Design Project Manager of the source of the planting soil.
 - ii. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - iii. Boulders: Include source location for boulders, and representative photos typical of rock yard or quarry specific to the Project.
 - e. Product testing
 - i. For each unamended soil type and the specified planting soil, furnish soil analysis and a written report by a qualified soil-testing laboratory. At a minimum, soil analysis shall include:
 - f. Percentages of organic matter.
 - i. Gradation of sand, silt, and clay content (including a grain size distribution curve)
 - ii. Cation exchange capacity.
 - iii. Percentage of deleterious material (greater than #4 screen).
 - iv. pH.

- v. Mineral and plant-nutrient content of soil (nitrogen, phosphorous and potassium at a minimum).
- g. Samples - for each specified product
- h. Maintenance Plan listing all actions and their schedule for contractor maintenance during the warranty period. This will include, but not be limited to, watering, weeding, fertilizing, and mowing.
- i. Inspection
 - i. Exterior Plants
 - I. Inspection – Contractor shall receive approval of exterior plant products and materials before offloading of material. Attendance required by:
 - a) Landscape Architect
 - b) SCF Operations Representative
 - c) Contractor Representative
 - II. Inspection – Contractor shall receive approval of planting bed layout and installation before moving ahead with next product and/or material installation. Attendance required by:
 - a) Landscape Architect
 - b) SCF Operations Representative
 - c) Contractor Representative
 - ii. Subgrade and Drainage
 - I. Inspection – Contractor shall receive approval of subgrade and drainage before moving ahead with next product and/or material installation. Attendance required by:
 - a) Landscape Architect
 - b) SCF Operations Representative
 - c) Contractor Representative
 - iii. Planting soil
 - I. Planting soil Installation Inspection – Contractor shall receive approval of planting soil placement before moving ahead with installation of plant materials. Attendance required by:
 - a) Landscape Architect
 - b) SCF Operations Representative
 - c) Contractor Representative

- iv. Substantial Completion – All products and materials complete before this inspection
 - I. Inspection – Contractor shall receive punch list of final items to complete before project closeout. Attendance required by:
 - a) Landscape Architect
 - b) SCF Project Manager
 - c) SCF Operations Representative
 - d) Design Team Prime Project Manager
 - e) Contractor Representative
- v. Irrigation
 - I. Inspection – Perform system test, per 32 98 00 Irrigation. Attendance required by:
 - a) Landscape Architect
 - b) SCF Operations Representative
 - c) Contractor Representative
- vi. Acceptance Inspection
 - I. Inspection to verify that all products and materials have been installed per Substantial Completion punch list. Attendance required by:
 - a) Landscape Architect
 - b) SCF Operations Representative
 - c) Design Team Prime Project Manager
 - d) Contractor Representative
- vii. Warranty Completion Inspection
 - I. Attendance required by:
 - a) Landscape Architect
 - b) SCF Operations Representative
 - c) Design Team Prime Project Manager
 - d) Contractor Representative

SECTION 32 91 00 – PLANTING SOIL

Section includes: Planting soil. Project options related to minimum specification content.

7. Design Requirements

- a. For all Alaskan projects, the Municipality of Anchorage Standard Specifications (MASS) establishes minimum specification requirements, with special provisions per this specification section. Each project will identify the specification format to be followed. The following is expected based on project location:
 - i. Municipality of Anchorage: Most current edition of Municipality of Anchorage Standard Specifications (MASS) with special provisions per this document or as recommended by consultant.
 - ii. Mat-Su Borough: Most current edition of Matanuska-Susitna Borough Standard Modification Documents with special provisions per this document or as recommended by consultant.
 - iii. Other communities without standard specifications:
 - I. Option 1: Most current edition of Municipality of Anchorage Standard Specifications (MASS).
 - II. Option 2: Most current edition of the Alaska Department of Transportation and Public Facilities Standard Specification for Highway Construction with special provisions as necessary to achieve an equivalent or greater level of guidance as the Municipality of Anchorage Standard Specifications (MASS).
 - III. Option 3: CSI format specifications as necessary to achieve an equivalent or greater level of guidance as the Municipality of Anchorage Standard Specifications (MASS).
 - b. Plant health and longevity
 - c. Maintenance
8. Products
- a. All products are per MASS U.O.N.
 - b. Submittal – Contractor to provide submittal to SCF that indicates proposed source for planting soil, with either test results that prove the soil does not include weed species or invasive plant material identified in the USDA Alaska Invasive Species List or a SCF rep can visit the pit location and verify in person. This submittal is necessary to move ahead with planting soil installation.
9. Execution
- a. All products are installed per MASS, and manufacturer's product information as relevant.

SECTION 32 92 00 – LAWNS AND GRASSES

Section includes: Seed Mixes, Lawn Fertilizer, Lawn Lime, Tackifier (mulch), Sod

10. Design Requirements

- a. Aesthetics
- b. Safety
- c. Plant health and longevity
- d. Maintenance

11. Products

- a. All products are per MASS U.O.N.

12. Execution

- a. All products are installed per MASS, and manufacturer's product information as relevant.

SECTION 32 93 00 – EXTERIOR PLANTS

Section includes: Plant Material, Mulch, Anti-desiccants, Fertilizer/Lime, Water, Wood Stakes and Ties, Landscape Edging, Pesticides/Herbicides. Project options related to minimum specification content. For all Alaskan projects, the Municipality of Anchorage Standard Specifications (MASS) establishes minimum specification requirements, with special provisions per this specification section. Each project will identify the specification format to be followed.

The following is expected based on project location:

1. Municipality of Anchorage: Most current edition of Municipality of Anchorage Standard Specifications (MASS) with special provisions per this document or as recommended by consultant.
2. Mat-Su Borough: Most current edition of Matanuska-Susitna Borough Standard Modification Documents with special provisions per this document or as recommended by consultant.
3. Other communities without standard specifications:
 - a. Option 1: Most current edition of Municipality of Anchorage Standard Specifications (MASS).
 - b. Option 2: Most current edition of the Alaska Department of Transportation and Public Facilities Standard Specification for Highway Construction with special provisions as necessary to achieve an equivalent or greater level of guidance as the Municipality of Anchorage Standard Specifications (MASS).
 - c. Option 3: CSI format specifications as necessary to achieve an equivalent or greater level of guidance as the Municipality of Anchorage Standard Specifications (MASS).

1. Aesthetics
2. Safety
3. Plant health and longevity
4. Maintenance

Part 2 – Products

1. All products are per MASS U.O.N.
2. All plant materials shall be nursery grown. No native dug material shall be allowed unless for use within revegetation or naturalized planting areas.
3. Plant Materials NOT approved for use on SCF Campus:
 - a. All species on the following lists:
 - i. USDA Select Invasive Plants of Alaska (latest version)
4. Landscape Edging:
 - a. Preferred product:
 - i. Manufacturer: Permaloc
 - ii. Model: Cleanline XL. 6-inch depth edging with 18-inch depth stakes.
 - iii. Attachment: Staked
 - iv. Finish: Aluminum
5. Shovel-cut edge shall be:
 - a. An 8-inch depth cut edge separating two types of softscape materials

Part 3 – Execution

1. All products are installed per MASS, and manufacturer's product information as relevant.
2. Landscape edging shall be installed:
 - a. Around the perimeter of the building maintenance strip
 - b. In locations around ornamental planting beds with high visibility
 - c. Around the mulched bed of individual deciduous tree plantings in lawn
 - d. Between maintained landscape areas and lawn
 - e. Provide 18-inch depth stakes
3. Shovel-cut edge shall be installed in the following locations:
 - a. Around mulched bed at base of individual evergreen trees
 - b. Between naturalized planting areas and lawn
4. Inspect per Section 32 90 00 – Planting General

SECTION 32 94 00 – LANDSCAPE ACCESSORIES

Section includes: Boulders, landscape fabric, geotextile fabric, mineral mulch and building maintenance strip and project options related to minimum specification content.

13. Design Requirements

- a. For all Alaskan projects, the Municipality of Anchorage Standard Specifications (MASS) establishes minimum specification requirements, with

special provisions per this specification section. Each project will identify the specification format to be followed. The following is expected based on project location:

- i. Municipality of Anchorage: Most current edition of Municipality of Anchorage Standard Specifications (MASS) with special provisions per this document or as recommended by consultant.
- ii. Mat-Su Borough: Most current edition of Matanuska-Susitna Borough Standard Modification Documents with special provisions per this document or as recommended by consultant.
- iii. Other communities without standard specifications:
 - I. Option 1: Most current edition of Municipality of Anchorage Standard Specifications (MASS).
 - II. Option 2: Most current edition of the Alaska Department of Transportation and Public Facilities Standard Specification for Highway Construction with special provisions as necessary to achieve an equivalent or greater level of guidance as the Municipality of Anchorage Standard Specifications (MASS).
 - III. Option 3: CSI format specifications as necessary to achieve an equivalent or greater level of guidance as the Municipality of Anchorage Standard Specifications (MASS).

- b. Aesthetics
- c. Safety
- d. Plant health and longevity
- e. Maintenance

14. Products

- a. All products are per MASS U.O.N.
- b. Building maintenance strip
 - i. Mulch:
 - I. Mineral mulch
 - II. Alternative: Shredded bark mulch, per MASS
- c. Landscape edging: per 32 93 00
- d. Landscape fabric: per MASS

15. Execution

- a. All products are installed per MASS, and manufacturer's product information as relevant.

SECTION 32 97 00 – LANDSCAPE MAINTENANCE

This Section includes: Maintenance Period and Warranty, Maintenance of Exterior Plants, Maintenance of Lawns and Grasses, Clean-up, Inspection

16. Design Requirements

- a. Maintenance Period and Warranty shall be:
 - i. For exterior plants and everything included in this section: one year
 - ii. For lawns and grasses and everything included in this section: one year
- b. Inspection to occur after warranty period ends – see 32 90 00 – Planting General.

17. Products (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

18. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 32 98 00 – IRRIGATION

Section includes: All work and materials for the design and installation of the various types of irrigation systems.

1. Design Requirements

- a. Aesthetics
- b. Safety
- c. Plant health and longevity
- d. Maintenance

2. Products

- a. Watering Bags
 - i. Preferred product:
 - I. Manufacturer: Treegator
 - II. Model: The Original for deciduous trees, Jr. Pro for evergreen or clumped trees.
 - III. Attachment: Freestanding
- b. All irrigation system components shall be new and of industrial or commercial grade. All components shall be fabricated by brand name manufacturers.
 - i. HDPE Pipes and fittings: Pipe and fittings for use in irrigation main piping 1-1/2 inches in diameter or less shall be SDR-11 high-density polyethylene (HDPE) pipe. Piping over 1-1/2 inches in diameter shall be SDR-17 HDPE pipe.

- ii. Trace Wire - For irrigation lines where control wiring is not run with the line, 12-gauge copper trace wire shall be installed as shown on drawings.
- iii. Control Wiring and Automatic Controllers:
 - I. Control wire shall be UF-UL listed, color coded copper conductor direct burial size 18. Where control wire runs are anticipated to be greater than 800 feet, provide 14-gauge wiring. Do not use green color-coded wire.
 - II. Provide waterproof Wire Connectors for wiring.
 - III. Automatic Controller: Hunter Pro-C Controller with 6 stations (with expansion capability to 15 stations) with an internal transformer.
 - IV. Controllers shall be programmable and shall operate on 120 VAC input, with 24 VAC output to electrical valves.
 - V. Controllers shall be recommended by the manufacturer for commercial use.
- iv. Valve box with lid:
 - I. Plastic valve box suitable for designed irrigation system with lockable lid. Submit for approval.
- v. Quick Coupler:
 - I. Coordinate with O&M for the selection of a quick coupler.
- vi. Drip Emitter:
 - I. Rainbird Xeri-Bug XB-05PC, XB-10PC and XB-20PC (or approved equivalent).
 - II. Install HDPE piping of sufficient sizes to provide for intended drip emitter operation as described by the manufacturer.
 - III. Provide one flush out assembly at each end of the drip system as shown on the plans.
- vii. Landscape dripline:
 - I. Rainbird landscape dripline or approved equivalent.
- viii. Control Valves and Controller:
 - I. Valves shall be Hunter or approved equivalent. Install valves in plastic boxes with reinforced heavy duty lockable plastic covers.

3. Execution

- a. Install per manufacturer's instructions.

b. Perform System Test/Inspection:

- i. A pressure and leakage test will be conducted in the presence of the Design Project Manager following the completion of the main and lateral line assembly. The irrigation lines shall be tested under hydrostatic pressure to 60 psi. The test duration shall be 2 hours. Test pressure shall be maintained for the duration of the test. If leaks develop, the joints shall be replaced and the test repeated until the entire system is proven watertight. Tests shall be observed and approved by the Design Project Manager before completion of backfill.

DIVISION 33 – UTILITIES

SECTION 33 10 00 – WATER UTILITIES

1. Design Requirements
 - a. Regulatory Authority
 - i. U.S. Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC)
 - ii. Local regulatory authorities where appropriate.
 - b. Facility Site Selection – When feasible, connect water utility to a municipal system.
2. Products
 - a. Pipe Materials (in order of preference)
 - i. PVC
 - ii. HDPE
 - iii. Ductile Iron
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 33 30 00 – SANITARY SEWERAGE

1. Design Requirements
 - a. Regulatory Authority
 - i. EPA and ADEC
 - ii. Local regulatory authorities where appropriate.
 - b. Facility Site Selection – When feasible, connect sanitary sewerage utility to a municipal system.
2. Products
 - a. Pipe Materials (in order of preference)
 - i. PVC
 - ii. HDPE
 - iii. Ductile Iron
 - b. Covers and Inlets: Cast iron covers and lids rated for H20 loading.
3. Execution (NOT USED. FIELD RESERVED FOR FUTURE INPUT.)

SECTION 33 40 00 – STORMWATER UTILITIES

1. Design Requirements

- a. Design to the most current EPA/ADEC APDES and local regulatory authorities permit criteria.
- b. Manholes shall be spaced a maximum of 200 ft.
- c. Storm drain outlets must drain to an area that will not flow over vehicles or pedestrian access. The outlet must also have a bar grate to prevent access.
- d. Bury piping a minimum of eight feet below grade.
- e. Covers and Inlets: Cast iron covers and lids rated for H20 loading.

2. Products

- a. Minimum 18-inch diameter pipe; 12-inch diameter may be used in certain situations on approval by SCF.
- b. Acceptable pipe materials:
 - i. Spiral corrugated galvanized/aluminized steel pipe with annual end corrugations and gasketed joints.
 - ii. Corrugated HDPE pipe with smooth bore liner and gasketed joints
- c. Manholes: Precast concrete construction rings and risers with evenly spaced ladder rungs. Allow minimum 12-inch of free space between bottom of manhole and invert of inlet/outlet pipe knockouts. Pipe knockouts are to be precast with approved grout ring and boot.
- d. Covers and Inlets: covers shall be stamped "STORMWATER" with a printed picture of a salmon as provided by Core & Main or equal.

3. Execution

- a. Wrap assembled joints on corrugated pipe with double wrap of filter fabric.