

RANCHO LOS AMIGOS SOUTH CAMPUS

ISD + Probation | Volume 2
Performance Criteria



Gensler

RLA South Campus - Design/Build Scoping Documents-Parcel B

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ELEMENT A – SUBSTRUCTURE

A10 FOUNDATIONS

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A1010.10 Wall Foundations

- A. Description: Continuous footings below load bearing walls.
- B. Functional and Performance Requirements:
 - 1. Provide wall foundation system as required by Code to support the completed and occupied building safely without uncontrolled subsidence or other movement.
 - 2. Drainage: Provide method of collecting and positively draining water from below spaces below grade.
 - 3. Waterproofing: Provide permanent waterproofing at portions of foundation that extend below grade.
- C. Applicable Components:
 - 1. Minimum Wall Thickness: Not less than thickness of superstructure walls supported by foundation walls, or as required for structural integrity and performance.
 - 2. Footings: Minimum thickness of 12 in (300 mm), or as required for structural integrity and performance.
 - 3. Concrete shall have a minimum compressive strength of 3000 psi with a w/c ratio limited to 0.5 and pozzolan (fly ash or silica fume) to improve durability of concrete in contact with soil.
 - 4. Provide adequate reinforcement for temperature and shrinkage per ACI-318.

A1010.30 Column Foundations

- A. Description: Spread footings below columns.
- B. Functional and Performance Requirements:
 - 1. Provide column foundation system as required by Code to support the completed and occupied building safely without uncontrolled subsidence or other movement.
 - 2. Drainage: Provide method of collecting and positively draining water from below spaces below grade.
 - 3. Waterproofing: Provide permanent waterproofing at portions of foundation that extend below grade.
- C. Applicable Components:
 - 1. Footings: Minimum thickness of 12 in (300 mm), or as required for structural integrity and performance.

2. Concrete shall have a minimum compressive strength of 3000 psi with a w/c ratio limited to 0.5 and pozzolan (fly ash or silica fume) to improve durability of concrete in contact with soil.
3. Provide adequate reinforcement for temperature and shrinkage per ACI-318.

A1010.90 Standard Foundation Supplementary Components

- A. Description: Housekeeping pads and anchor bolts.
 1. Provide housekeeping concrete pads and anchor bolts for major equipment. Pads shall extend 6-inches beyond perimeter of equipment or equipment base.

A40 SLABS-ON-GRADE

A4010 Standard Slabs-on-Grade

- A. Description: Provide slabs-on-grade as required enclosing habitable spaces and supporting interior functions without subsidence, structural cracking, or other uncontrolled movement.
- B. Functional and Performance Requirements:
 1. Slabs-on-grade comprise structural slabs that are installed over fill or at excavated and compacted grade, including all depressions in the floor, such as trenches, pits, and sumps. Slabs-on-grade also include equipment bases; under floor and perimeter drainage and moisture barriers installed integrally with floor system.
 2. Floor Flatness (FF): Provide floors on grade engineered and constructed to achieve Specified Overall Value (SOV) at 35, and Minimum Localized Value (MLV) at 30, when measured in accordance with ASTM E 1155 current edition.
 3. Floor Levelness (FF): Provide floors on grade engineered and constructed to achieve Specified Overall Value (SOV) of 25, and Minimum Localized Value (MLV) of 20, when measured in accordance with ASTM E 1155 current edition.
- C. Applicable Components:
 1. Concrete shall have a minimum compressive strength of 3000 psi with a w/c ratio of 0.5 and pozzolan (fly ash or silica fume) to improve durability of concrete in contact with soil.
 2. Provide minimum slab thickness of 5-inches (125 mm), with minimum reinforcement of #4 reinforcing bars at 18 inches o.c. each way, placed at mid-depth.
 3. Provide adequate reinforcement for temperature and shrinkage per ACI-318.
 4. Provide housekeeping concrete pads and anchor bolts for major equipment. Pads shall extend 6-inches beyond perimeter of equipment or equipment base.
 5. Floor Classifications: For concrete floors on grade, comply with composition and finishing recommendations of ACI302.1 R current edition for floor classifications based on type of anticipated traffic and intended use. For Class 1: Utilize minimum 28-day compressive strength of 3000psi; maximum slump of 4 in; single troweling; nonslip finish where required. For Class 2: Provide

minimum 28-day compressive strength of 3000psi; maximum slump of 4 in;
light steel-troweled finish; curing methods that will not interfere with applied
interior finishes

A4090 Slab-On-Grade Supplementary Components

A4090.20 Vapor Retarder

- A. Description: 15 mil vapor retarder, installed under slab-on grade, over subbase layer specified in A4090.60.
- B. Functional and Performance Requirements:
 - 1. Comply with ASTM E 1745, Class A.
 - 2. Maximum perm rating: 0.01.
- C. Applicable Components:
 - 1. 15 mil high performance polyethylene vapor retarder membrane. Provide thicker membrane if required by Geotechnical Report. (project Geotechnical Report, dated January 13, 2010, prepared by Mactec, Inc., is bound into the Appendices).
 - 2. Joint tape.

A4090.60 Subbase Layer

- A. Description: Subbase layer for concrete slabs on grade.
- B. Functional and Performance Requirements:
 - 1. 4-inch minimum thickness, per project Geotechnical Report.
- C. Applicable Components:
 - 1. Crushed rock or sand base, as recommended in project Geotechnical Report.

A60 WATER AND GAS MITIGATION

A6010 Building Subdrainage

A6010.10 Foundation Drainage

- A. Description: Subdrainage systems for foundations and underslab areas.
- B. Functional and Performance Requirements:
 - 1. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Lay perforated pipe with perforations down.
 - 2. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated.
 - 3. Underslab Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent.
 - 4. Install PE piping according to ASTM D 2321.
 - 5. Install PVC piping according to ASTM D 2321.
 - 6. Join PE pipe, tubing, and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties."
 - 7. Join perforated, PE pipe and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties"; or according to ASTM D 2321.
 - 8. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.
 - 9. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.
- C. Applicable Components:
 - 1. Underground Subdrainage Piping: Perforated PE pipe and fittings, couplings, and coupled joints; perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.
 - 2. Underslab Subdrainage Piping: Perforated PE pipe and fittings, couplings, and coupled joints; perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.
 - 3. Perforated plastic pipe shall be either smooth wall polyvinyl chloride plastic pipe, corrugated polyvinyl chloride plastic pipe with a smooth interior surface, or corrugated polyethylene plastic tubing. Smooth wall polyvinyl chloride plastic pipe shall conform to the requirements in AASHTO Designation M 278. Corrugated polyvinyl chloride plastic pipe with a smooth interior surface shall conform to the material and structural requirements in AASHTO Designation M 278. The pipe shall have perforations located in the bottom half of the pipe, and the perforations shall consist of slots meeting the size and opening area requirements in AASHTO Designation M 252. The inside diameter and diameter tolerances shall conform to the requirements of either AASHTO Designations M

- 252 or M 278. Corrugated polyethylene plastic tubing shall conform to the requirements in AASHTO Designation M 252 or M 294.
4. Pipe Perforations- NPS 4: four rows of perforations per ASTM F 758, section 7.2.4., and Table 5.
 5. Pipe Perforations - NPS 6 and 8: Four rows of perforations per ASTM F 758, section 7.2.4., and Table 5.
 6. Pipe Perforations - NPS 10 and larger: Six rows of perforations per ASTM F 758, section 7.2.4., and Table 5.
 7. Polyvinyl chloride pipe shall be connected with belled ends, or with sleeve type or stop type couplings conforming to the requirements in AASHTO Designation: M 278. Polyethylene tubing shall be connected with snap on, screw on, or wrap around fittings and couplings conforming to the requirements of AASHTO Designation: M 252 or M 294. Solvent cementing of joints will not be required.
 8. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.
 9. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.
 10. Molded-Sheet Drainage Panels: Prefabricated geocomposite, 36 to 60 inches wide with drainage core faced with geotextile filter fabric.
 11. Prefabricated Drainage Core: Three-dimensional, nonbiodegradable, molded PP or PS. Select prefabricated drainage core recommended by the manufacturer for the type of application specified elsewhere in the contract documents. Minimum Compressive Strength: 10,000 pound force (lbf)/square foot according to ASTM D 1621. Minimum In-Plane Flow Rate: Ten gallons per minute (gpm)/foot according to ASTM D-4716.
 12. Filter Fabric: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; Grab Elongation: 60 percent maximum according to ASTM D-4632. Apparent Opening Size: No. 70 sieve, minimum according to ASTM D-4751. Water Flow Rate: 165 gpm/square foot according to ASTM D-4491.
 13. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gallons per minute (gpm)/square foot when tested according to ASTM D 4491. Structure Type: Nonwoven, needle-punched continuous filament or woven, monofilament or multifilament. Style(s): Flat and sock.
 14. Backfill, drainage course, impervious fill, and satisfactory soil materials as specified in G1070 Site Earthwork.

A90 SUBSTRUCTURE RELATED ACTIVITIES

A9010 Substructure Excavation

A9010.10 Backfill and Compaction

- A. Description: Excavation and backfilling for buildings and structures.
- B. Functional and Performance Requirements- Refer to G1070.10, G1070.20, and the following:
 - 1. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspection.
 - 2. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 3. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner, without additional compensation.
 - 4. Grading Inside Building Lines: Finish subgrade to a tolerance of one-half inch when tested with a 10-foot straight edge.
- C. Applicable Components:
 - 1. Refer to G1070.10 and G1070.20.

END OF ELEMENT A

ELEMENT B – SHELL

Extra Materials: Design-Builder shall provide “Added Stock” materials in accordance with Project General Requirements.

B10 SUPERSTRUCTURE

B1010 Floor Construction

B1010.10 Floor Structural Frame

- A. Description: Provide structural elements, above grade, capable of supporting all anticipated loads without failure or damage.
- B. Functional and Performance Requirements:
 - 1. Provide the superstructure load-bearing structural members of capacities required by LACBC and ASCE 7.
 - 2. Impact Resistance of Load-Bearing Members: Use materials that are not easily damaged by common hand tools.
 - 3. Provide fire-resistive assemblies where required, in compliance with LACBC requirements and UL Designs.
- C. Applicable Components
 - 1. Load-bearing cast-in-place concrete walls or metal stud walls, structural steel framing, steel roof deck, and minor structural steel.

B1010.20 Floor Decks, Slabs, and Toppings

- A. Description: Provide structural floor deck/slab elements, above grade, capable of supporting all anticipated loads without failure or damage, and as required by applicable Code.
- B. Functional and Performance Requirements:
 - 1. Provide the superstructure load-bearing structural members of capacities required by LACBC and ASCE 7.
 - 2. Design and construct the superstructure to resist loads from weights of building including, but not limited to, construction materials, mechanical-electrical-plumbing systems, equipment; and fire protection, where required, and all other live and dead loads imposed on it.
 - 3. Provide fire-resistive deck/slab assemblies where required, in compliance with LACBC requirements and UL Designs.
 - 4. Floor Flatness (FF): Provide floors above grade engineered and constructed to achieve Specified Overall Value (SOV) at 35, and Minimum Localized Value (MLV) at 30, when measured in accordance with ASTM E 1155 current edition.
 - 5. Floor Levelness (FF): Provide floors above grade engineered and constructed to achieve Specified Overall Value (SOV) of 25, and Minimum Localized Value (MLV) of 20, when measured in accordance with ASTM E 1155 current edition.
 - 6. Fabricate floor deck in accordance with Steel Deck Institute (SDI) Publication No. 31.

7. The floor/ceiling assembly shall provide a minimum sound isolation performance rating of STC 55. This level of sound isolation performance shall be maintained at the slab edge and exterior walls.

C. Applicable Components:

1. Cast-in-place concrete slabs.
2. Steel floor deck, Grade 33 minimum, with G60 galvanized coating per ASTM A653; gauge as required for structural performance, and minor structural steel.
3. Clear penetrating sealer at exposed concrete slabs.

B1020 Roof Construction

B1020.10 Roof Structural Frame

- A. Description: Provide structural elements, above grade, capable of supporting all anticipated loads without failure or damage, and as required by applicable Code.
- B. Functional and Performance Requirements:
 1. Provide the superstructure load-bearing structural members of capacities required by County of Los Angeles Building Code (LACBC) and ASCE 7.
 2. Impact Resistance of Load-Bearing Members: Use materials that are not easily damaged by common hand tools.
 3. Provide fire-resistive assemblies where required, in compliance with LACBC requirements and UL Designs.
 4. Applicable Components:
 5. Load-bearing concrete masonry walls, concrete walls or metal stud walls, structural steel framing, steel roof deck, and minor structural steel.
 6. Cast-in-place concrete slabs.

B1020.20 Roof Decks, Slabs, and Sheathing

- A. Description: Provide structural roof framing elements capable of supporting all anticipated loads without failure or damage.
- B. Functional and Performance Requirements:
 1. Design and construct the superstructure to resist loads from weights of building including, but not limited to, construction materials, mechanical-electrical-plumbing systems, equipment; and fire protection, where required, and all other live and dead loads imposed on it.
 2. Impact Resistance of Load-Bearing Members: Use materials that are not easily damaged by common hand tools.
 3. Provide fire-resistive deck assemblies where required, in compliance with LACBC requirements and UL Designs.
 4. Fabricate roof deck in accordance with Steel Deck Institute (SDI) Publication No. 31.
 5. The roof assembly shall provide sound isolation performance in accordance with the acoustic requirements.

C. Applicable Components:

1. Steel roof deck, Grade 33 minimum, with G60 galvanized coating per ASTM A653; gauge as required for structural performance, and minor structural steel.

B1020.30 Canopy Construction

A. Description: Provide structural canopy framing and deck elements capable of supporting all anticipated loads without failure or damage.

B. Functional and Performance Requirements:

1. Design and construct the superstructure to resist loads from weights of building including, but not limited to, construction materials, mechanical-electrical-plumbing systems, equipment; and fire protection, where required, and all other live and dead loads imposed on it.
2. Impact Resistance of Load-Bearing Members: Use materials that are not easily damaged by common hand tools.
3. Provide non-combustible and fire-resistive canopy assemblies where required, in compliance with LACBC requirements and UL Designs.
4. Fabricate canopy roof deck in accordance with Steel Deck Institute (SDI) Publication No. 31.

C. Applicable Components:

1. Steel roof deck, Grade 33 minimum, with G60 galvanized coating per ASTM A653; gauge as required for structural performance, and minor structural steel.
2. Structural steel framing. Fabricate and finish per AESS requirements where steel is exposed to view, from grade to 8-feet above grade.
3. Membrane roofing or metal roof panels.
4. Sloped glazing assemblies.

B1080 Stairs

B1080.10 Stair Construction

A. Description: Steel-framed or cast-in-place concrete stairs (exit stairs) and decorative metal stairs (locations where stair structure is not enclosed within a stair shaft).

B. Functional and Performance Requirements:

1. Minimum Standard: NAAMM Commercial Class, unless more stringent requirements are indicated.
2. Structural Performance Requirements: Capable of resisting gravity loads, 100 pounds per square foot uniform load, and 300 pound concentrated load (applied to a 4-square inch area). Uniform and concentrated loads need not be assumed to act concurrently. Stair framing shall be capable of withstanding stresses resulting from railing loads in addition to loads specified above.
3. Seismic Performance: Capable of withstanding the effects of earthquake forces determined per County of Los Angeles Building Code, current edition, and ASCE/SEI 7. Component Importance Factor: 1.5.
4. Exit and Service Stairs: Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

5. Stairs with Terrazzo, Stone, or Tile Treads: Limit deflection of treads, platforms, and framing members to $L/720$ or $1/4$ inch or $1/4$ inch, whichever is less.
6. Regulatory Requirements: Comply with the requirements of Part 1910 of the Occupational Safety and Health Standards (OSHA), the American Disabilities Act (ADA), and local regulatory requirements as applicable to stairs, handrails and the protection of openings; where regulatory requirements conflict the more stringent shall apply.

C. Applicable Components:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Tubing: ASTM A 500 (cold-formed) or ASTM A 513.
3. Steel Pipe: ASTM A 53, Type S - Seamless, Grade A suitable for close coiling or cold bending, standard weight (Schedule 40) minimum, unless otherwise indicated or required to satisfy performance requirements.
4. Galvanized finish for exterior installations and where indicated.
5. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25 (Grade 170), unless another grade is required by design loads; exposed.
6. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial quality or structural quality, Grade 33 (Grade 230), unless another grade is required for performance requirements.
7. Precast concrete stair treads, 3000 psi minimum.
8. Concrete fill for treads, 3000 psi minimum.
9. Terrazzo, Stone, or Tile Treads and Risers: Refer to Element C.

B1080.50 Stair Railings

- A. Description: Pipe railings (exit and service stairs), decorative metal railings at exposed decorative metal stairs.
- B. Functional and Performance Requirements:
 1. Railings shall with stand the effects of gravity loads, uniform load of 50 lbf/foot applied in any direction, and concentrated load of 200 lbf applied in any direction. Railing infills shall be capable of resisting a concentrated load of 50 lbf applied horizontally on an area of 1 square foot.
 2. Regulatory Requirements: Comply with the requirements of Part 1910 of the Occupational Safety and Health Standards (OSHA), the American Disabilities Act (ADA), and County of Los Angeles Building Code requirements as applicable to stairs, handrails and the protection of openings; where regulatory requirements conflict the more stringent shall apply.
- C. Applicable Components:
 1. Steel Pipe: ASTM A 53, Type S - Seamless, Grade A suitable for close coiling or cold bending, standard weight (Schedule 40) minimum, unless otherwise indicated or required to satisfy performance requirements.
 2. Galvanized finish for exterior installations and where indicated.

3. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch (50-mm) woven-wire mesh, made from 0.162-inch (4.1-mm) nominal diameter wire complying with ASTM B 211 (ASTM B 211M), Alloy 6061-T94.
4. Decorative Metal Railings: Aluminum, steel, stainless steel, or copper alloy (brass/bronze) railing systems.
5. Glass-Supported or Post-Supported Railings with Glass Infill: Metal system as indicated above, with laminated glass.

B20 EXTERIOR VERTICAL ENCLOSURE

B2010 Exterior Walls

B2010.10 Exterior Wall Veneer

- A. Description: Brick veneer, precast concrete panels, or metal panels applied over exterior wall framing and sheathing as a finish assembly. Subject to compliance with air and moisture infiltration requirements, open-joint (rain screen) or sealed joint type assemblies are acceptable.
- B. Functional and Performance Requirements:
 1. Structural Performance: Provide exterior wall veneer systems capable of withstanding the effects of gravity loads and design wind pressure.
 2. Seismic Performance: Provide exterior wall veneer systems capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," and County of Los Angeles Building Code (LACBC) requirements.
 3. Comply with MNL-120 PCI Design Handbook – Precast and Prestressed Concrete, latest edition, for precast concrete panels.
- C. Applicable Components:
 1. Brick Veneer: Clay face brick, ASTM C216, Grade MW, Type FBX, anchored to steel stud framing with hot-dip galvanized adjustable seismic masonry anchors. Type N mortar.
 2. Architectural precast concrete wall panels.
 3. Metal Wall Panels (Prefinished): Aluminum composite, aluminum plate, or formed aluminum or galvanized steel wall panels, solid or perforated, with high performance organic coating finish system.
 4. Metal Wall Panels (Natural finish): Zinc, copper, or stainless steel panels, solid or perforated.

B2010.20 Exterior Wall Construction

- A. Description: All walls above grade (Including openings) shall be designed as systems that are to resist positive and negative wind loads, air infiltration and water penetration while accommodating building movements and environmental requirements of the building's mechanical and electrical services. Wall systems shall be capable of resisting earthquake loads per ASCE 7 and LACBC criteria. Provide construction that will have thermal resistance as necessary to maintain interior comfort levels specified. The construction will prevent deterioration of materials due to condensation of moisture vapor inside wall assemblies.
- B. Functional and Performance Requirements:
1. Wind Loads: Wall assemblies shall resist design wind loads indicated in Building Design Criteria (Structural).
 2. Impact Resistance: Wall assemblies shall resist impacts from windborne debris (propelled at up to 35 mph) and hail stones ½ inch in diameter.
 3. Select finish materials with consideration to capability to resist potential vandalism.
 4. Weather Resistance: Wall assembly construction will minimize deterioration due to precipitation, sunlight, ozone, normal temperature changes, and atmospheric pollutants.
 5. Energy Efficiency: Design wall assemblies in accordance with the requirements of California Building Energy Efficiency Standards.
 6. The exterior wall assembly shall provide sound isolation performance in accordance with the acoustic requirements.
 7. Fire Performance Requirements: Comply with NFPA 285 requirements for fire propagation within the exterior wall assembly. (Applicable to Type I, II, III, or IV buildings over 40 feet in height above grade).
 8. Tilt-up Concrete Panel Standard: Grade A-Architectural, per Tilt-up Concrete Association (TCA) guide specifications, current edition.
 9. Cast-in-Place Architectural Concrete Standard: Comply with American Concrete Institute (ACI), ACI 303.1, "Specification for Cast-in-Place Architectural Concrete," current edition, and ACI 303R, "Guide to Cast-In-Place Architectural Concrete Practice."
- C. Applicable Components:
1. Cold-formed metal framing, 0.0538-inch base metal thickness, 4-inch minimum depth, with G90 hot-dip galvanized coating. Maximum allowable deflection-L/600 typical, L/720 at brick veneer areas.
 2. Glass-mat faced gypsum sheathing, ½ inch minimum thickness, ASTM C 1177. Provide Type X material where required to comply with fire-resistive assembly designs.
 3. Air barrier, self-adhering type, capable of performing as a continuous vapor-retarding air or vapor permeable barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration.

4. Miscellaneous steel framing, ASTM A 36, A 500.
5. Tilt-up concrete panels with architectural form liner finish; provide mockups to demonstrate quality of workmanship, and aesthetic effects.
6. Cast-in-place architectural concrete; provide mockups to demonstrate quality of workmanship, and aesthetic effects.

B2010.30 Exterior Wall Interior Skin

- A. Description: Interior skin assemblies for framed exterior walls, and furred interior walls over solid substrates.
- B. Functional and Performance Requirements:
 1. Comply with LACBC and UL Design requirements where interior skin forms part of a fire-resistive wall assembly.
 2. Provide furring of sufficient depth to accommodate electrical and data junction boxes and conduit.
 3. Gypsum board products at framed exterior walls: Mold and moisture-resistant core and facings per ASTM C1396.
- C. Applicable Components
 1. Metal stud furring, extended 6 inches beyond suspended ceiling.
 2. Steel Stud Exterior Walls: Gypsum board, ½ inch minimum thickness, mold and moisture resistant type per ASTM C 1396, with moisture and mold resistant core and facing surfaces. Provide 5/8 inch Type X gypsum board, mold and moisture resistant core and facing surfaces, at interior face of fire-resistive exterior wall assemblies.
 3. Furred Walls Over Concrete Masonry Exterior Walls: Gypsum board, ½ inch minimum thickness, mold and moisture resistant type per ASTM C 1396, with moisture and mold resistant core and facing surfaces.

B2010.40 Fabricated Exterior Wall Assemblies

- A. Description: Glazed aluminum curtain wall system, thermally broken.
- B. Functional and Performance Requirements:
 1. Air Leakage: Air leakage through glazed aluminum curtain wall assembly shall not have exceeded 0.06 cfm/sq. ft. of fixed wall area when tested in accordance with ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft.
 2. Water Resistance: Water penetration resistance shall be rated at 20 percent of the maximum wind design pressure based on calculations according to ASCE 7-10, but not less than 8.0 psf, and tested in accordance with ASTM E 331 (one 15 minute cycle), and ASTM E 547 (minimum three cycles) Perform field testing of 5 percent of installed units, but not less than one test per each glazing assembly type, per AAMA 503 at full design pressure; no one-third pressure reduction is permitted.
 3. Thermal Performance: Design, fabricate and install the glazed aluminum curtain wall system with the assembly U-factor maximum to comply with ASHRAE 90.1 and County of Los Angeles Green Building Code for the project specific geographic location of the building project when tested according to NFRC 100.

4. Solar Heat-Gain Coefficient: Provide glass for glazed aluminum curtain wall with an assembly SHGC maximum to comply with ASHRAE 90.1 and County of Los Angeles Green Building Code for the project specific geographic location of the building project as determined according to NFRC 200 procedures. Use of applied glazing films to achieve required thermal performance is not permitted.
5. Glass Statistical Factor: Glass thicknesses are to be confirmed by the Design-Builder and/or glass manufacturer. All glass for the size openings required will be provided in thicknesses such that the probability of breakage at the design "Wind Load" will not exceed 8 lights per 1000 lights (S.F. 2.5) based on a 3 second gust wind load duration.
6. Class I anodized (AAMA 611) or three-coat (AAMA 2605) fluoropolymer coating on all exposed aluminum components.
7. Wind Loads: The glazed aluminum curtain wall work, including glass, shall be designed, fabricated and installed to withstand the maximum inward and outward wind pressures as required by ASCE 7 and LACBC for the design wind pressures.
8. Building Frame Movement: Design, fabricate and install glazed aluminum curtain wall to withstand building movements including thermal movements, loading deflections, shrinkage, creep and similar movements.
9. The exterior window wall assembly shall provide sound isolation performance in accordance with the acoustic requirements.

C. Applicable Components:

1. Aluminum curtain wall framing.
2. Insulating glass units, compliant with performance requirements.
3. Metal spandrel panels.
4. Sun shades.

B2010.60 Equipment Screens

A. Description: Prefabricated or site-built equipment screens, to conceal rooftop equipment from view.

B. Functional and Performance Requirements:

1. Structural Performance: Provide equipment screens capable of withstanding the effects of design wind pressure.
2. Seismic Performance: Provide equipment screens capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," and County of Los Angeles Building Code (LACBC) requirements.

C. Applicable Components:

1. Metal Wall Panels: Aluminum composite, aluminum plate, or formed aluminum or galvanized steel wall panels, solid or perforated, with high performance organic coating finish system.
2. Stud framing and cement plaster screen assemblies not permitted.

B2010.80 Exterior Wall Supplementary Components

- A. Description: Thermal insulation, joint sealants, and water repellent/anti-graffiti coatings.
- B. Functional and Performance Requirements:
 - 1. Formaldehyde free insulation materials.
 - 2. Insulation materials: maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84.
 - 3. Silicone or polyurethane sealants: ASTM C 920, tested for compatibility with substrates.
 - 4. Clear, low sheen penetrating anti-graffiti coating system, capable of acting as a water repellent.
- C. Applicable Components:
 - 1. Board or blanket insulation.
 - 2. Silicone or polyurethane joint sealants.
 - 3. Anti-graffiti coating system at all walls and doors up to an architectural break or change in materials at 10' or more above the nearest adjacent grade.

B2020 Exterior Windows

B2020.20 Exterior Fixed Windows

- A. Description: Fixed aluminum windows, thermally broken.
- B. Functional and Performance Requirements:
 - 1. Performance Class: AW, per AAMA 101, capable of resisting design wind loads indicated in Building Design Criteria (Structural).
 - 2. Air Infiltration: Maximum .01 cfm/sq.ft.at inward test pressure of 6.24 lbf/sq. ft., tested per AAMA 101 IS.2, Air Infiltration Test.
 - 3. Water Resistance: Water penetration resistance shall be rated at 15 percent of the maximum wind design pressure based on calculations according to ASCE 7-10, but not less than 8.0 psf, and tested in accordance with ASTM E 331 (one 15 minute cycle), and ASTM E 547 (minimum three cycles) Perform field testing of 5 percent of installed units, but not less than one test per each glazing assembly type, per AAMA 502 at full design pressure; no one-third pressure reduction is permitted.
 - 4. Thermal Performance: Design, fabricate and install the aluminum windows with the assembly U-factor maximum to comply with ASHRAE 90.1 and County of Los Angeles Green Building Code for the project specific geographic location of the building project when tested according to NFRC 100.
 - 5. Solar Heat-Gain Coefficient: Provide glass for aluminum windows with an assembly SHGC maximum to comply with ASHRAE 90.1 and County of Los Angeles Green Building Code for the project specific geographic location of the building project as determined according to NFRC 200 procedures. Use of applied glazing films to achieve required thermal performance is not permitted.
 - 6. Forced-Entry Resistance: Comply with Performance Level 10 requirements when tested according to ASTM F 588.
 - 7. Glass Statistical Factor: Glass thicknesses are to be confirmed by the Design-Builder and/or glass manufacturer. All glass for the size openings required will

be provided in thicknesses such that the probability of breakage at the design "Wind Load" will not exceed 8 lights per 1000 lights (S.F. 2.5) based on a 3 second gust wind load duration.

8. Class I anodized (AAMA 611) or three-coat (AAMA 2605) fluoropolymer coating on all exposed aluminum components.
9. The exterior windows shall provide sound isolation performance in accordance with the acoustic requirements.

C. Applicable Components:

1. Aluminum window frames.
2. Insulating glass units, compliant with performance requirements.
3. Sheet metal flashings, closures, and trim.

B2020.30 Exterior Window Wall

A. Description: Aluminum storefront framing, thermally broken.

B. Functional and Performance Requirements:

1. Air Leakage: Air leakage through each entrance and storefront assembly shall not have exceeded 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of fixed wall area when tested in accordance with ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft.
2. Swinging Doors: Air leakage through each swinging entrance door shall not have exceeded 1.0 cfm/sq. ft. (5.0 L/s per sq. m) of surface area when tested in accordance with ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).
3. Water Resistance: Water penetration resistance shall be rated at 15 percent of the maximum wind design pressure based on calculations according to ASCE 7-10, but not less than 8.0 psf, and tested in accordance with ASTM E 331 (one 15 minute cycle), and ASTM E 547 (minimum three cycles) Perform field testing of 5 percent of installed units, but not less than one test per each glazing assembly type, per AAMA 502 at full design pressure; no one-third pressure reduction is permitted.
4. Thermal Performance: Design, fabricate and install the aluminum storefront system with the assembly U-factor maximum to comply with ASHRAE 90.1 and County of Los Angeles Green Building Code for the project specific geographic location of the building project when tested according to NFRC 100.
5. Solar Heat-Gain Coefficient: Provide glass for aluminum storefront with an assembly SHGC maximum to comply with ASHRAE 90.1 and County of Los Angeles Green Building Code for the project specific geographic location of the building project as determined according to NFRC 200 procedures. Use of applied glazing films to achieve required thermal performance is not permitted.
6. Glass Statistical Factor: Glass thicknesses are to be confirmed by the Design-Builder and/or glass manufacturer. All glass for the size openings required will be provided in thicknesses such that the probability of breakage at the design "Wind Load" will not exceed 8 lights per 1000 lights (S.F. 2.5) based on a 3 second gust wind load duration.
7. Class I anodized (AAMA 611) or three-coat (AAMA 2605) fluoropolymer coating on all exposed aluminum components.

8. Wind Loads: The aluminum-framed entrance and storefront work, including glass, shall be designed, fabricated and installed to withstand the maximum inward and outward wind pressures as required by ASCE 7 and LACBC for the design wind pressures.
9. Building Frame Movement: Design, fabricate and install aluminum-framed entrances and storefronts to withstand building movements including thermal movements, loading deflections, shrinkage, creep and similar movements.
10. The exterior window wall shall provide sound isolation performance in accordance with the acoustic requirements.

C. Applicable Components:

1. Aluminum storefront framing.
2. Aluminum/glass storefront doors and hardware (reference B2050.10).
3. Insulating glass units, compliant with performance requirements.

B2050 Exterior Doors and Grilles

B2050.10 Exterior Entrance Doors

- A. Description: Entry doors at public areas.
- B. Functional and Performance Requirements:
 1. HMMA 861 "Guide Specifications for Commercial Hollow Metal Doors and Frames."
 2. Opening force requirements per LACBC and ADA accessibility requirements.
 3. The exterior doors shall provide sound isolation performance in accordance with the acoustic requirements.
 4. All doors require ADA compliant, locking and latching hardware
- C. Applicable Components:
 1. Aluminum/glass storefront type, compliant with LACBC/ADA accessibility requirements. Finish to match adjacent curtain wall or storefront framing.
 2. Steel Doors: Flush design, hollow metal construction, 0.053-inch steel sheet faces with G90 coating, prepared for field painting. Weep holes at bottom to allow trapped moisture to escape.
 3. Steel frames and door hardware (Reference B2050.90).

B2050.20 Exterior Utility Doors

- A. Description: Exterior steel doors and frames.
- B. Functional and Performance Requirements:
 1. HMMA 861 "Guide Specifications for Commercial Hollow Metal Doors and Frames."
 2. Opening force requirements per LACBC and ADA accessibility requirements.
 3. Provide UL listed and labeled doors at openings in fire-resistance rated exterior walls.
 4. All doors require ADA compliant, locking and latching hardware

- C. Applicable Components:
 - 1. Steel Doors: Flush design, hollow metal construction, 0.053-inch steel sheet faces with G90 coating, prepared for field painting. Weep holes at bottom to allow trapped moisture to escape.
 - 2. Frames and hardware (Reference B2050.90).

B2050.30 Exterior Oversize Doors

- A. Description: Overhead coiling doors at Loading Dock area.
- B. Functional and Performance Requirements:
 - 1. 20,000 cycle rated.
 - 2. Capability to resist design wind loads and wind driven debris impacts.
- C. Applicable Components:
 - 1. Galvanized steel door and hood, with manufacturer's standard weather seals at jamb guides, and pneumatic bottom bar..
 - 2. Steel jamb guides and support framing.
 - 3. Motor operator, safety disconnect device, and interlock to prevent door operation if door is locked.
 - 4. Manufacturer's standard heavy duty, momentary-contact type three button control station.

B2050.90 Exterior Door Supplementary Components

- A. Description: Steel door frames, and door hardware
- B. Functional and Performance Requirements:
 - 1. Opening force requirements per LACBC and ADA accessibility requirements.
- C. Applicable Components:
 - 1. Door Hardware: BHMA A156.1, Grade 1. Provide hardware complying with DPW Door Hardware Specifications (reference Appendix No. 78). Provide locksets with removable cores, compatible with the campus keying system.
 - 2. Steel Door Frames: 0.053-inch steel, welded corners, with G90 coating, prepared for field painting.

B2070 Exterior Louvers and Vents

B2070.10 Exterior Louvers

- A. Description: Metal louvers integrated into building façade.
- B. Functional and Performance Requirements:
 - 1. Provide units with free area and performance capabilities as required by mechanical system performance requirements, and capability to resist design wind loads.
 - 2. Provide storm-rated units with drainable blades, and capability to resist wind-driven rain.
 - 3. Provide factory-finished units; field painted louvers not permitted.
 - 4. Exterior louvers and vents shall provide sound isolation performance in accordance with the acoustic requirements.

- C. Applicable Components:
 - 1. Fixed, formed metal or extruded louvers.
 - 2. Uninsulated blank-off panels; black finish.
 - 3. Insect screens.
 - 4. Flashings, closures, and trim to match louvers.

B30 Exterior Horizontal Enclosures

B3010 Roofing

B3010.50 Low Slope Roofing (Vegetated Roofing System)

- A. **Description: Extensive-type vegetated roof system.**
- B. Functional and Performance Requirements:
 - 1. Maximum media density and maximum media water-retention per ASTM E 2399.
 - 2. Green roof system wind uplift rating according to "Standard test method for wind resistance of modular vegetated roof assembly (CAN/CSA-A123.24-15)."
 - 3. Flood test installed system for 48 hours; replace any waterproofing which leaks, or other defective components.
 - 4. Alternative Testing: Perform Electronic Field Vector Mapping (EFVM) testing of full system; flood test at drains only.
- C. Applicable Components:
 - 1. Waterproofing Membrane: Hot fluid-applied rubberized asphalt system, 215 mil minimum total system thickness.
 - 2. Continuous protection course.
 - 3. HDPE root barrier and drainage composite
 - 4. Container modules, recycled polyethylene, black or gray.
 - 5. Soil insert collar, biodegradable material or recycle polyethylene.
 - 6. Growing medium.
 - 7. Plants, to be approved by roof assembly manufacturer.
 - 8. Edge restraint, aluminum.
 - 9. Access boxes with removable covers for accessing drains, valves, switches.

B3010.55 Low-Slope Roofing (Membrane Roofing System)

- A. Description: Single ply roofing system, insulation, and flashings.
- B. Functional and Performance Requirements:
 - 1. Installed roofing and base flashings shall withstand uplift pressures indicated in Building Design Criteria (Structural), thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight. Installed system shall slope to drain at 3/8 inch per foot minimum.
 - 2. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 - 3. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

4. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
5. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.
6. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes selected; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
7. 20 year, no dollar limit guarantee.

C. Applicable Components:

1. PVC single ply feltback membrane, 60 mil minimum thickness, fully adhered or mechanically fastened.
2. Rigid insulation (board and tapered insulation).
3. Cover boards.
4. Walkway pads or rolls.
5. Metal flashings clad with membrane material.

B3010.90 Roofing Supplementary Components

- A. Description: Sheet metal flashing and trim, equipment curbs.
- B. Functional and Performance Requirements:
 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality, mill phosphatized for field painting.
 2. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, No. 4 finish (at locations where flashing will be buried or otherwise inaccessible).
 3. Fabricate curb units to minimum height of 8 inches.
 4. Where slope of roof deck exceeds 1/4 inch per foot (1:48), fabricate curb and equipment support units with height tapered to match slope to level tops of units.
- C. Applicable Components:
 1. Manufactured reglets and formed sheet metal counterflashing.
 2. Miscellaneous sheet metal flashing.
 3. Prefabricated equipment curbs.

B3040 Traffic Bearing Horizontal Enclosures

B3040.30 Horizontal Waterproofing Membrane

- A. Description: Hot, fluid-applied rubberized asphalt membrane.
- B. Functional and Performance Requirements:
 - 1. Flood test installed system for 48 hours; replace any waterproofing which leaks, or other defective components.
- C. Applicable Components:
 - 1. Hot, fluid-applied rubberized asphalt waterproofing system, reinforced membrane 215 mil minimum total system thickness.
 - 2. Self-adhering rubberized asphalt waterproofing membrane (at waterproofing areas less than 150 sf, or with limited access for performing installation).
 - 3. Protection course and drainage composite.
 - 4. Rigid insulation boards, minimum 60 psi compressive strength.
 - 5. Deck pedestals.

B3040.50 Wear Surfaces

- A. Description: Pedestal pavers, porcelain tile on mortar bed over waterproofing membrane, or fluid-applied urethane pedestrian traffic topping/waterproofing system applied over structural slab. (traffic topping system permitted only at areas over unoccupied spaces).
- B. Functional and Performance Requirements:
 - 1. Dynamic Coefficient of Friction (DCOF): 0.42.
 - 2. Standard Grade tiles per ANSI A137.1.
- C. Applicable Components:
 - 1. Concrete pavers.
 - 2. Porcelain tiles and grout.
 - 3. Fluid-applied traffic topping.

END OF ELEMENT B

ELEMENT C – INTERIORS

Extra Materials: Design-Builder shall provide “attic stock” materials in 5 percent of the quantities installed, for all floor finishes, acoustical ceiling panels, paints and wall covering materials, and other interior finish materials subject to customary wear and tear. Design-Builder shall coordinate detailed “attic stock” requirements with end users based on the project-specific finishes installed, and “Project Added Stock” section of the “Project General Requirements”.

Materials finish and color boards with sample of all proposed interiors finishes shall be provided for LA County approval.

C10 INTERIOR CONSTRUCTION

C1010 Interior Partitions

C1010.10 Interior Fixed Partitions

- A. Description: Interior gypsum board partitions, fire-resistive construction where required.
- B. Functional and Performance Requirements:
 - 1. Working Load: 5 psf.
 - 2. Deflection Limits: L/240 (typical); L/360 (partitions with tile finish).
 - 3. Fire Resistive Assemblies: Compliant with UL tested assemblies.
 - 4. Gypsum Board Finish per GA-214: Level 4 (typical), Level 5 (surfaces receiving semi-gloss paints, painted graphics, or wall coverings).
 - 5. Acoustical Performance: Where an acoustical rating is required, provide partition assembly tested by a qualified testing agency for sound transmission loss performance according to ASTM E90, calculated according to ASTM E 413, and rated not less than the required STC value.
- C. Applicable Components:
 - 1. Steel studs, 0.033-inch base metal thickness, galvanized.
 - 2. Regular or Type X gypsum board (at fire resistive assemblies), per ASTM C 1396, ½ inch minimum thickness.
 - 3. Glass-mat faced gypsum tile backing board or cementitious barker units at partitions receiving tile.
 - 4. Mold and moisture-resistant gypsum board, ASTM C 1396, at wet areas not receiving tile finish.

C1010.20 Interior Glazed Partitions

- A. Description: Aluminum-framed interior partitions, consisting of sidelights and borrowed lights integrated into gypsum board partitions.
- B. Functional and Performance Requirements:
 - 1. Fire-resistive assemblies complying with NFPA 80.
 - 2. Glass deflection limitations per California Building Code, latest edition.

C. Applicable Components:

1. Extruded aluminum frames and glazing stops, 0.062-inch minimum wall thickness.
2. Manufacturer's standard anodized or powder coated finish.
3. Clear fully tempered safety glass, thickness as required to comply with CBC deflection limitations.
4. Applied Glazing Film: A water-resistant, permanent, translucent patterned vinyl film laminated to a clear pressure sensitive adhesive and transparent synthetic liner.

C1010.40 Interior Demountable Partitions

A. Description: Demountable glass partitions with swinging doors.

B. Functional and Performance Requirements:

1. Structural Performance: Provide demountable partitions capable of withstanding the effects of gravity loads.
2. Load-Bearing Capacity: Not less than 300-lb concentrated, 2.3-lb/linear inch distributed proof load when tested according to Business and Institutional Furniture Manufacturers Association (BIFMA) X 5.6.
3. Transverse-Load Capacity: Lateral deflection of not more than 1/120 of the overall span when tested under a uniformly distributed load of 5 lb/sq. ft. according to ASTM E 72.
4. Deflection: Where interior glazing is installed adjacent to a walking surface, the differential deflection of two adjacent unsupported edges shall not be greater than the thickness of the panels when a force of 50 plf is applied horizontally to one panel at any point up to 42 inches above the walking surface.
5. Acoustical Performance: Where acoustical rating is required, provide demountable-partition assembly tested by a qualified testing agency for sound transmission loss performance according to ASTM E 90, calculated according to ASTM E 413, and rated for not less than the required STC value. The design intent of the STC criteria in the acoustics section is that the STC/NIC criteria for demising partitions applies to the demountable partition panels, wall head and all through penetrations, not just the panel.

C. Applicable Components:

1. Glass Units: Clear, fully tempered glass.
2. Manufacturer's standard glass or flush wood doors.
3. Framing and Trim: Continuous, factory-finished, snap-on type; adjustable for variations in floor and ceiling levels.
4. Exposed-Metal Trim Finish: Manufacturer's standard.
5. Applied Glazing Film: A water-resistant, permanent, translucent patterned vinyl film laminated to a clear pressure sensitive adhesive and transparent synthetic liner.

C1010.50 Interior Operable Partitions

- A. Description: Manual, horizontally sliding, acoustical panel partitions.
- B. Functional and Performance Requirements:
 - 1. Sound Transmission Requirements: Operable panel partition assembly tested in a full-scale opening, 14 feet by 9 feet (4.27 m by 2.74 m), for laboratory sound transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for STC 50, +/-1.
- C. Applicable Components:
 - 1. Individual or hinged paired panels.
 - 2. Track, seals, and operating hardware.

C1010.90 Interior Partition Supplementary Components

- A. Description:
 - 1. Through-penetration firestop systems, where required by fire-resistive assembly designs, and sound attenuation insulation.
 - 2. Perimeter and through-penetration acoustical components, where required by sound isolation designs.
- B. Functional and Performance Requirements:
 - 1. Through-penetration firestop assemblies compliant with listed UL Designs.
 - 2. Sound attenuation insulation: Compliant with fire-resistance rated partition designs, and capable of providing the required STC ratings as part of an acoustically rated assembly.
 - 3. Walls, floors, ceilings and building façade penetrations where sound isolation performance is required.
 - 4. Perimeters of walls where sound isolation performance is required.
 - 5. Edge of slab conditions at the exterior façade or curtain wall conditions where sound isolation performance is required.
- C. Applicable Components:
 - 1. UL listed through penetration firestop systems for all items penetrating fire-resistive partitions, with fire resistance ratings equivalent to adjacent construction. At head-of-wall, base-of-wall, and wall-to-wall conditions, provide UL listed fire-resistive joint systems with fire resistance ratings equivalent to adjacent construction.
 - 2. Glass fiber or mineral fiber sound attenuation blankets.
 - 3. Acoustical sealant. Utilized at the head and sill of walls and at all through penetrations of walls, floors, ceilings and building façade elements where sound isolation performance is required.
 - 4. Sound batt fiberglass or mineral wool insulation. Compliant with sound isolation requirements.
 - 5. Fire stop moldable putty pads. Utilized at junction boxes and AV back boxes in walls where sound isolation performance is required.

6. Fire stop moldable putty sticks. Utilized at cable tray penetrations where sound isolation performance is required.
7. Resilient sway braces. Utilized in double stud walls where sound isolation performance is required.

C1020 Interior Windows

C1020.20 Interior Fixed Windows

- A. Description: Interior borrowed lights and sidelights which are not part of glazed partition systems, or glazed demountable partitions.
- B. Functional and Performance Requirements:
 1. Fire-resistive assemblies complying with NFPA 80.
 2. Glass deflection limitations per California Building Code.
 3. Acoustical Performance: Where acoustical rating is required, provide window assembly tested by a qualified testing agency for sound transmission loss performance, and rated for not less than the required STC value.
- C. Applicable Components:
 1. Aluminum or steel frames; provide labeled frames at fire-resistive openings. Provide factory finishes units.
 2. Clear fully tempered safety glass, thickness as required to comply with CBC deflection limitations.
 3. Fire-resistive glazing products at fire-resistive openings.
 4. Applied Glazing Film: A water-resistant, permanent, translucent patterned vinyl film laminated to a clear pressure sensitive adhesive and transparent synthetic liner.

C1030 Interior Doors

C1030.10 Interior Swinging Doors

- A. Description: Interior swinging doors, fire-resistance rated where required.
- B. Functional and Performance Requirements:
 1. Fire-resistance rated doors complying with NFPA 80.
 2. Door assemblies to provide sound isolation performance in accordance with the acoustical requirements.
 3. All doors require ADA compliant, locking and latching hardware.
- C. Applicable Components:
 1. Wood Doors: 1 3/4 inch thick solid core with wood veneer faces, WI Custom Grade, factory finished.
 2. Steel Doors: Flush design, hollow metal construction with 0.042-inch sheet steel faces, labeled for fire/smoke resistance where required, primed for field painting.

C1030.20 Interior Entrance Doors

- A. Description: All-glass entrances or aluminum storefront doors at interior spaces.
- B. Functional and Performance Requirements:
 - 1. Comply with ADA and California Building Code (CBC) accessibility requirements.
 - 2. Glass deflection limitations per 2016 California Building Code.
 - 3. All doors require ADA compliant, locking and latching hardware.
- C. Applicable Components:
 - 1. Aluminum storefront framing.
 - 2. Aluminum/glass storefront doors and hardware (reference C1030.90).
 - 3. All I anodized (AAMA 611) or three-coat (AAMA 2605) fluoropolymer coating on all exposed aluminum components.
 - 4. All-glass entrance doors and sidelights, with metal top and bottom rails.
 - 5. Hardware for all-glass entrance doors.
 - 6. Clear fully tempered safety glass, thickness as required to comply with CBC deflection limitations.
 - 7. Applied Glazing Film: A water-resistant, permanent, translucent patterned vinyl film laminated to a clear pressure sensitive adhesive and transparent synthetic liner.
 - 8. Decorative metal cladding (stainless steel, bronze or brass, prefinished aluminum) top and bottom rails.

C1030.40 Interior Coiling Doors

- A. Description: Overhead coiling service counter doors.
- B. Functional and Performance Requirements:
 - 1. Service Life: 20,000 cycles.
- C. Applicable Components:
 - 1. Stainless steel door curtain and countertop.
 - 2. Crank hoist.
 - 3. Keyed lock at bottom bar.

C1030.80 Interior Access Doors and Panels

- A. Description: Metal access panels as required for accessing concealed mechanical, plumbing, and other utility components.
- B. Functional and Performance Requirements:
 - 1. Match fire-resistance rating of adjacent construction where access doors and panels are located in fire-resistive partitions.
- C. Applicable Components:
 - 1. Steel panels with exposed flange, factory primed (typical locations).
 - 2. Recessed access panels with insert for gypsum board, or glass-fiber reinforced gypsum panels (gypsum board ceilings).
 - 3. Stainless steel access panels with exposed flange, #4 finish (wet areas).

C1030.90 Interior Door Supplementary Components

- A. Description: Steel or aluminum frames, and door hardware.
- B. Functional and Performance Requirements:
 - 1. UL labeled frames, complying with NFPA 80, at fire-resistive rated openings.
 - 2. Hardware configuration and operation compliant with ADA and California Building Code accessibility requirements.
- C. Applicable Components:
 - 1. Extruded aluminum frames, 0.062-inch minimum wall thickness.
 - 2. Steel frames, full profile welded, 0.053-inch thickness, factory primed.
 - 3. Door Hardware: BHMA A156.1, Grade 1. Provide hardware complying with DPW Door Hardware Specifications (reference Appendix No. 78). Provide locksets with removable cores, compatible with County keying system.
 - 4. Locks will be re-keyed by County locksmith at completion of construction. Provide key blanks to County; coordinate quantities with County locksmith.

C1070 Suspended Ceiling Construction

C1070.10 Acoustical Suspended Ceilings

- A. Description: Suspended acoustical ceiling assemblies, consisting of suspension components, seismic bracing, lay-in ceiling panels, trim, and related accessories.
- B. Functional and Performance Requirements:
 - 1. Seismic Performance: capable of resisting seismic forces (Seismic Zone 4), in accordance with CISCA Guidelines for Seismic Restraint of Direct Hung Ceiling Assemblies.
 - 2. Fire Performance Requirements: Per California Building Code requirements for interior finishes, based upon Occupancy classification and construction Type per Code.
 - 3. Light Reflectance: 0.75 minimum.
 - 4. NRC: 0.85 minimum.
- C. Applicable Components:
 - 1. Suspension System: ASTM C 635, intermediate duty, wide or narrow face tees and wire hangers.
 - 2. Seismic restraint clips and compression struts.
 - 3. Acoustical Lay-in Panels (Front of House): ASTM E 1264, Class III, Form 1, 2, ,3, or 4, Pattern D (Fissured), narrow face grid.
 - 4. Acoustical Lay-in Panels (Back of House): ASTM E 1264, Class III, IV, or IX, Form 1, 2, ,3, or 4, Pattern C, D, E, or G, narrow or wide face grid.
 - 5. Acoustical Lay-in Panels (Wet Areas): ASTM E 1264, Class IX, Form 1, 2, ,3, or 4, Pattern G, wide face grid.

C1070.20 Suspended Plaster and Gypsum Board Ceilings

- A. Description: Suspended gypsum board ceiling assemblies, consisting of metal suspension system, seismic bracing, gypsum board, and related trim.
- B. Functional and Performance Requirements:
 - 1. Seismic performance per ASCE 7 and California Building Code.
 - 2. Deflection Limit: L/360.
 - 3. Framing members sized not less than that required to comply with ASTM C 754, for the deflection limits indicated.
- C. Applicable Components:
 - 1. Wire hangers.
 - 2. Cold-rolled steel carrying channels.
 - 3. Steel furring channels.
 - 4. Compression struts.
 - 5. Sag-resistant gypsum board, ½ inch minimum thickness.
 - 6. Manufactured metal grid system per ASTM C 645, in lieu of steel channel assembly.

C1070.50 Specialty Suspended Ceilings

- A. Description: Linear metal baffle or torsion-spring metal ceiling panel systems.
- B. Functional and Performance Requirements:
 - 1. Seismic Performance: Capable of resisting seismic forces (Seismic Zone 4), in accordance with CISWCA Guidelines for Seismic Restraint of Direct Hung Ceiling Assemblies.
 - 2. Fire Performance Requirements: Per California Building Code requirements for interior finishes, based upon occupancy classification and construction type per Code.
 - 3. NRC: 0.85 minimum
 - 4. Provide systems with access capabilities for maintenance; provide concealed access panels.
 - 5. Provide prefinished panels or baffles, with manufacturer's standard painted, powder coated, or wood veneer finishes.
- C. Applicable Components:
 - 1. Perforated metal baffles (linear baffle systems), or torsion spring panels, micro-perforated, with manufacturer's standard sound absorptive material adhered to concealed face of baffle or panels.
 - 2. Suspension System: ASTM C 635, intermediate duty, with manufacturer's standard tees suitable for supporting baffles or panels, and wire hangers. "Stick built" or "kit of parts" suspension systems not permitted.
 - 3. Seismic restraint clips and compression struts.

C1070.70 Special Function Suspended Ceilings

- A. Description: Suspended, stretched fabric ceiling systems.
- B. Functional and Performance Requirements:
 - 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency or systems prepared according to ASTM E 2573. Identify products with appropriate marking of applicable testing agency. Flame-Spread index: 25 or less. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.
 - 3. Lighting Reflectance: Average value not less than 0.75 when tested according to ASTM E 1477
 - 4. NRC: 0.80 minimum.
- C. Applicable Components:
 - 1. Suspension System: ASTM C 635, intermediate duty, suitable for supporting stretched-fabric ceiling system, and wire hangers.
 - 2. Acoustical core material and backing.
 - 3. Fabric facing.

C1090 Interior Specialties

C1090.10 Interior Railings and Handrails

- A. Description: Decorative metal interior railings at locations other than stairs.
- B. Functional and Performance Requirements:
 - 1. Railings shall with stand the effects of gravity loads, uniform load of 50 lbf/foot applied in any direction, and concentrated load of 200 lbf applied in any direction. Railing infills shall be capable of resisting a concentrated load of 50 lbf applied horizontally on an area of 1 square foot.
 - 2. Regulatory Requirements: Comply with the requirements of the American Disabilities Act (ADA) and California Building Code requirements as applicable to guardrails, handrails and the protection of openings; where regulatory requirements conflict the more stringent shall apply.
- C. Applicable Components:
 - 1. Decorative Metal Railings: Aluminum, steel, stainless steel, or copper alloy (brass/bronze) railing systems.
 - 2. Glass-Supported or Post-Supported Railings with Glass Infill: Metal system as indicated above, with laminated glass.

C1090.20 Information Specialties

- A. Description: Interior Code required room identification and restroom signage. Refer to Building and Site Design Criteria (Signage and Wayfinding), Volume 1, for additional information.
- B. Functional and Performance Requirements:

1. Comply with California Building Code requirements for Braille and text, including tactile characters.
2. Comply with local fire authority requirements for fire/life safety related signage.

C. Applicable Components:

1. Acrylic flat cut letters, paint finish, pinned off wall.
2. Tempered glass panel with silkscreened or applied vinyl film graphics and stainless steel escutcheons.
3. Acrylic panel, paint finish, with applied vinyl film graphics and clear coat.
4. Acrylic panel with .064-inch thick etched zinc face with raised tactile room number and copy, including Braille text.
5. Acrylic panel with .064-inch thick etched zinc face with raised tactile room number and copy, including Braille text. Sign footer: Layered acrylic for changeable paper inserts.
6. Acrylic panel with .064-inch thick etched zinc face with raised tactile room number and copy, including Braille text. Sign footer: Layered acrylic for sliding message inserts.
7. Acrylic panel with .064-inch thick etched zinc face with raised tactile pictograms and copy, including Braille text.
8. Acrylic panel (circle or triangle) with paint finish, and applied vinyl film pictogram with clear coat.
9. Acrylic panel with subsurface silkscreened graphics on non-glare acrylic face.
10. Acrylic panel with screen printed copy.
11. Aluminum panel sign, with paint finish, applied vinyl film copy, and clear coat.
12. Fasteners and mounting hardware.

C1090.25 Compartments and Cubicles

- A. Description: Toilet compartments and screens.
- B. Functional and Performance Requirements:
 1. Comply with ADA and CBC accessibility requirements.
 2. "Zero sight line" at compartment doors for occupant privacy.
- C. Applicable Components:
 1. Solid phenolic compartments and screens, overhead mounted.
 2. Self-closing hinges at compartments.
 3. Heavy duty, vandal-resistant, stainless steel door hardware.

C1090.35 Wall and Door Protection

- A. Description: Impact-resistant wall covering materials and corner guards (Semi-rigid plastic sheet) at all gypsum board walls of 3.0 Support Spaces, 4.0 Specialty Spaces, 5.0 Loading Dock areas, and heavy traffic hallways and corridors, unless noted otherwise.
- B. Functional and Performance Requirements:
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.
 - 3. Self-Extinguishing per ASTM D 635.
- C. Applicable Components:
 - 1. Semi-rigid plastic sheet, 0.125-inch thick.
 - 2. Edge trim.
 - 3. Corner Guards

C1090.40 Toilet, Bath, and Laundry Accessories

- A. Description: Commercial stainless-steel toilet room accessories, vandal-resistant type.
- B. Functional and Performance Requirements:
 - 1. Comply with ADA and CBC accessibility requirements.
 - 2. Electrical components listed and labeled per NFPA 70.
 - 3. Grab Bars: Resist downward load of 250 lbf, tested per ASTM F 446.
 - 4. Acceptable Manufacturers: A & J Washroom Accessories, American Specialties, Inc., Bobrick Washroom Equipment, Inc., Bradley Corporation.
- C. Applicable Components:
 - 1. Partition-mounted and recessed combination units (toilet tissue dispenser, seat cover dispenser, sanitary napkin disposal).
 - 2. Grab bars.
 - 3. Warm air dryers (sensor operated, hands free).
 - 4. Soap dispensers (sensor operated, hands free)
 - 5. Sanitary napkin dispensers
 - 6. Baby Changing Stations
 - 7. Paper towel dispensers and waste receptacles
 - 8. Mirrors.
 - 9. Shower seats.

C1090.70 Storage Specialties

- A. Description: Personnel lockers, High density mobile storage systems & Gun Lockers.
- B. Functional and Performance Requirements:
 - 1. Personnel Lockers: For lockers required to be accessible, comply with applicable provisions in the USDOJ's "ADA Standards for Accessible Design" and California Building Code (CBC) accessibility requirements.
 - 2. Provide factory-assembled laminate-clad wood lockers, with minimum 5/8 inch thick side, back, top and bottom panels, and minimum 5/8 inch thick doors.

3. Seismic Performance: Mobile shelving systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and California Building Code.
4. Structural Performance: Provide mobile shelving systems capable of supporting 1000 lb/ft. load per linear foot of carriage.
5. Operating Force: For manually operated systems, maximum 1 lbf required to move 1000 lb.

C. Applicable Components:

1. Plastic laminate-clad personnel lockers.
2. Manual or mechanical-assist operated mobile storage shelving.
3. Fully recessed, powder coated gun lockers, 16 gauge, welded steel construction with continuous, tamper resistant heavy duty piano hinges

C20 INTERIOR FINISHES

C2010 Wall Finishes

C2010.10 Tile Wall Finish

- A. Description: Porcelain wall tiles (full height).
- B. Functional and Performance Requirements:
 1. Standard Grade tiles per ANSI 137.1.
- C. Applicable Components:
 1. Porcelain tiles.
 2. Latex-portland cement mortar (thinset), TCNA W245.
 3. Epoxy grout (Kitchen), Polymer-modified grout (other areas).

C2010.20 Wall Paneling

- A. Description: Fiber-reinforced plastic (FRP) panels at Janitor's Closet and Food Service.
- B. Functional and Performance Requirements:
 1. Flame Spread: 25 or less, ASTM E 84.
 2. Smoke Developed: 450 or less, ASTM E 84.
- C. Applicable Components:
 1. Gelcoat-finished glass-fiber reinforced ("FRP") panels, ASTM D5319.
 2. Adhesives and trim.

C2010.30 Wall Coverings

- A. Description: Vinyl or fabric wall coverings.
- B. Functional and Performance Requirements:
 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency on systems prepared according to ASTM E 2573.

Identify products with appropriate markings of applicable testing agency. Flame-Spread Index: 25 or less. Smoke-Developed Index: 450 or less.

2. Provide rolls of each type of wall covering from the same run number or dye lot.

C. Applicable Components:

1. Commercial quality vinyl or fabric wall covering material, with manufacturer's standard backing.
2. Strippable adhesive

C2010.50 Stone Facing

A. Description: Interior stone wall facing.

B. Functional and Performance Requirements:

1. Association Standards for Quality and Fabrication: "Design Manual VII" of Marble Institute of America (MIA), "Specifications for Architectural Granite" as published by the National Building Granite Quarriers Association (NBGQA), and "Indiana Limestone Handbook" as published by the Indiana Limestone Institute (ILI).
2. Accurately cut, dress, drill, fit and finish stonework to shapes, profiles, and dimensions shown on Drawings and/or final shop and setting drawings. Make exposed surfaces straight, sharp, true and continuous at joints within the tolerances specified.
3. Wall Cladding: $\frac{3}{4}$ inch (19.05 mm), unless otherwise shown.

C. Applicable Components:

1. Stone wall and column facing, and miscellaneous stone trim.
2. Provide anchors and attachments of type and size required to support stonework.
3. Expansion Anchors: Stainless steel, Type 304. Type, size and load capacity as required to support loading of 4 times the loads imposed by stone cladding system. Do not use lead shield expansion bolts or cinch anchors.
4. Anchor Tiebacks: Type 304 stainless steel dowels, cramps, straps, discs and rods in standard commercial tempers and hardness as required to sustain imposed loads and in no case less than 3/16 inch (4.5 mm) thick, complying with ASTM A 666.
5. Setting Shims: Resilient plastic shims, non-staining to stone, sized to suit joint thicknesses.
6. Sealants and grout.

C2010.60 Acoustical Wall Treatment

A. Description: Stretched-fabric or fabric wrapped acoustical wall surfacing system, concealed-fastener, site-assembled and upholstered.

B. Functional and Performance Requirements:

1. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by qualified testing agency on systems prepared according to ASTM E 2573. Identify products with appropriate markings of applicable testing agency. Flame-Spread Index: 25 or less. Smoke-Developed Index: 450 or less.
2. Fabrics shall be shop cut, stitched together, squared and trimmed to appropriate sizes. All sewing shall be perfectly straight, seams pressed flat. Provide appropriate lining on fabrics as required to avoid core material color showing through. The fabric backing/lining shall not degrade the sound absorption performance of the panels.
3. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.
4. NRC 0.80 minimum at 1-inch thick and NRC 1.00 minimum at 2-inch thick.

C. Applicable Components:

1. Frame System: Extruded PVC or extruded aluminum with concealed Z-clip mounting system.
2. Fabric -wrapped acoustical wall panels.
3. Acoustical Infill: Standard acoustical infill manufactured from 6-7 pcf density compressible fiberglass insulation.

C2010.70 Wall Painting and Coating

A. Description: Professional grade architectural coating systems for interior walls.

B. Functional and Performance Requirements:

1. Master Painters Institute (MPI) listed products.
2. VOC Limits: South Coast AQMD, Rule 1113.
3. Front of house areas (wall surfaces): Eggshell finish.
4. Back of house areas (wall surfaces): Semi-gloss finish.
5. Gypsum board ceilings (back of house/front of house): Flat finish.
6. Wet areas: Semi-gloss finish (epoxy system).

C. Applicable Components:

1. High performance architectural latex paint systems, low odor/low VOC.
2. Waterborne epoxy system, low VOC.

C2030 Flooring

C2030.10 Flooring Treatment

A. Description: Ground/polished concrete floor slab, with clear or stained penetrating sealer.

B. Functional and Performance Requirements:

1. Slip -resistant finish, minimum 0.42 Dynamic Coefficient of Friction (DCOF).

C. Applicable Components

1. Polish: Level 2, 400 grit.
2. Waterborne, VOC compliant penetrating sealer, clear or stained finish.

C2030.20 Tile Flooring

- A. Description: Porcelain tile flooring, quarry tile at food service areas.
- B. Functional and Performance Requirements:
 - 1. Dynamic Coefficient of Friction (DCOF): 0.42.
 - 2. Standard Grade tiles per ANSI 137.1.
 - 3. Seal unglazed tiles where recommended by tile manufacturer. Application of sealers to tile flooring for the purpose of achieving the required DCOF is not permitted.
 - 4. Seal all grout joints, unless recommended otherwise by grout manufacturer.
- C. Applicable Components:
 - 1. Porcelain tiles.
 - 2. Coved tile base.
 - 3. Thinset mortar and waterproof membrane (TCNA F122).
 - 4. Epoxy grout (Food Service areas), Polymer-modified grout (other areas).

C2030.30 Specialty Flooring

- A. Description: Static-control vinyl composition tile (VCT) in Server and Equipment Rooms.
- B. Functional and Performance Requirements:
 - 1. Electrical Resistance: Test per ASTM F 150 with 100-V applied voltage, UL 779, and ESD-STM-7.1. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground. Average greater than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.
 - 2. Static Generation: Less than 300 V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
 - 3. Static Decay: 5000 to zero V in less than 0.25 seconds when tested per FED-STD-101C/4046.1.
 - 4. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- C. Applicable Components:
 - 1. Static-Dissipative, Solid Vinyl Floor Tile : ASTM F 1700, Class I (monolithic), Type A (smooth surface).
 - 2. Heat-welding bead.
 - 3. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor-covering system to ground connection.

C2030.50 Resilient Flooring

- A. Description: Commercial sheet vinyl, solid vinyl tiles, and resilient wall base.
- B. Functional and Performance Requirements:
 - 1. Critical Radiant Flux: Class I, per ASTM E 648.
- C. Applicable Components

1. Rubber Wall Base: ASTM F 1861, Type TS or TP, 4-inch height. Straight base at carpet installations, coved base at resilient tile flooring.
2. Sheet Vinyl: ASTM F 1913 (unbacked), ASTM F 1303 (backed), minimum 0.080-inch thickness.
3. Integral sheet vinyl cove base.
4. Solid Vinyl Tile: ASTM F 1700, Class I, (Monolithic Vinyl Tile), Type A (smooth) or B (embossed) surface, 0.125-inch thickness.

C2030.60 Terrazzo Flooring

- A. Description: Conventional or resinous matrix (epoxy thinset) terrazzo flooring.
- B. Functional and Performance Requirements:
 1. Dynamic Coefficient of Friction (DCOF): For terrazzo installed on walkway surfaces, provide finished installation with DCOF value of 0.42, as determined by testing by the DCOF AcuTest Method per ANSI A137.1
 2. Terrazzo: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.
 3. Compressive Strength: 10,000 psi (68.95 MPa) per ASTM D 695.
 4. Water Absorption: 0.10 percent per ASTM D 570.
 5. Tensile Strength: 3000 psi (20.7 MPa) per ASTM D 638.
 6. Flexural Strength: 4500 psi (31.0 MPa) per ASTM D 790.
 7. Adhesion: 350 psi. (2.4 MPa), 100 percent concrete failure, per ACI 503R.
 8. Hardness: 65-85 Shore D, per ASTM D 2240.
 9. Impact Resistance: Withstands 16 ft/lbs (21.69 Nm), no chipping, cracking, spalling or loss of adhesion per MIL-D-3134, Sec. 4.7.3.
 10. Abrasion Resistance: 70-90 milligrams lost, per ASTM D 4060, CS 17 Wheel.
 11. Slip Resistance: Complies with performance requirements specified.
- C. Applicable Components:
 1. Terrazzo.
 2. Divider and top strips.
 3. Moisture barrier.

C2030.75 Carpeting

- A. Description: Commercial grade modular carpet tiles.
- B. Functional and Performance Requirements:
 1. Critical Radiant Flux: Class I, per ASTM E 648.
 2. 100 percent nylon, Type 6,6.
 3. Soil resistance treatment.
 4. Appearance Retention Rating: 3.0, Heavy Traffic.
 5. Tuft Bind: Not less than 5 lbf, per ASTM D 1335.
 6. Electrostatic Propensity: Less than 3.5 kV per AATCC 134.
 7. Yarn Weight: 20 ounces per square yard minimum.

- C. Applicable Components:
 - 1. Modular carpet tiles, with manufacturer's standard backing for glue-down or self-adhesive installation.

C2030.85 Entrance Flooring

- A. Description: Recessed aluminum entrance mats and frames.
- B. Functional and Performance Requirements:
 - 1. Structural Performance: Provide roll-up rail mats and frames capable of withstanding a uniform floor load of 300 lbf/sq. ft., and a Wheel load of 350 lb per wheel.
 - 2. Comply with ADA and CBC accessibility requirements.
- C. Applicable Components:
 - 1. Recessed aluminum frame.
 - 2. Roll-up, Aluminum-Rail Hinged Mats: Extruded-aluminum tread rails 1-1/2 inches (38 mm) wide by 3/8 inch (9.5 mm) thick, sitting on continuous vinyl cushions.
 - 3. Tread Inserts: Manufacturer's standard carpet, vinyl, or abrasive surface tread inserts.

C2030.90 Flooring Supplementary Components

- A. Description: Hydraulic-cement-based, polymer-modified, self-leveling underlayment for application below interior floor coverings.
- B. Functional and Performance Requirements:
 - 1. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.
 - 2. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 3. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Applicable Components:
 - 1. Hydraulic Cement Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thickness of 1/4 inch (6 mm) and that can be feathered at edges to match adjacent floor elevations.

C2040 Stair Finishes

C2040.20 Tile Stair Finish

- A. Description: Porcelain tile finish on concrete stair treads and landings.
- B. Functional and Performance Requirements:
 - 1. Refer to C2030.20
- C. Applicable Components:
 - 1. Porcelain tiles (ref. C2030.20)
 - 2. Mortar, grouts, and sealant (ref. C2030.20)
 - 3. Metal trim accessories

C2040.60 Terrazzo Stair Finish

- A. Description: Resinous matrix (epoxy thinset) terrazzo finish at stair treads and landings.
- B. Functional and Performance Requirements:
 - 1. Reference C 2030.60.
- C. Applicable Components:
 - 1. Precast terrazzo stair treads and risers.

C2050 Ceiling Finishes

C2050.70 Ceiling Painting and Coating

- A. Description: Professional grade architectural coating systems for gypsum board ceilings.
- B. Functional and Performance Requirements:
 - 1. Master Painters Institute (MPI) listed products.
 - 2. VOC Limits: South Coast AQMD, Rule 1113.
 - 3. Front of House spaces: Flat finish.
 - 4. Back of House and wet areas: Semi-gloss finish.
- C. Applicable Components:
 - 1. High performance architectural latex paint systems, low odor/low VOC.

END OF ELEMENT C

ELEMENT D – SERVICES

Extra Materials: Design-Builder shall provide “Added Stock” materials in accordance with Project General Requirements

D10 CONVEYING

D1010 Vertical Conveying Systems

D1010.10 Elevators – Passenger and Service

- A. Description: Where traction type elevators are installed, all hoisting machinery, governors, and controllers shall be located in machinery spaces separated from the elevator hoistway. Where conveyance machinery supporting a passenger car and/or counterweight is installed, the elevator guide rail shall not be utilized as the normal structural means of support for machines and its load. Elevator suspension means shall be no other than Traction Steel hoist ropes.
- B. Functional and Performance Requirements:
 - 1. Car Speed: at $\pm 3\%$ of contract speed under any loading condition.
 - 2. Car Capacity: Safely lower, stop and hold 125% of rated load.
 - 3. Car Stopping Zone: $\pm 1/4"$ under any loading condition.
 - 4. Door Opening Time: 2.4 seconds from start of opening to fully open.
 - 5. Door Closing Time: 4.6 seconds from start of closing to fully closed.
 - 6. Car Floor-to-Floor Performance Time: 12.5 Seconds from start of doors closing until doors are 3/4 open (1/2 open for side opening doors) and car level and stopped at next successive floor under any loading condition or travel direction.
 - 7. Car Ride Quality:
 - a. Horizontal acceleration within car during all riding and door operating conditions not more than 15 mg peak to peak (adjacent peaks) in the 1-10Hz range.
 - b. Acceleration and Deceleration: Smooth constant and not more than 3 feet/second²
 - c. Sustained Jerk: Not more than 8 ft/second.
 - 8. Duty Cycle for heat load calculations and oil cooler calculations should be based on no less than a 30% duty cycle, 120 starts per hour minimum
- C. Applicable Components:
 - 1. Capacity: 3500 pounds minimum (Passenger), 4500 pounds minimum (Service)
 - 2. Class loading: Passenger class A.
 - 3. Machine: Provide new permanent magnet (PM) gearless
 - 4. Machine location: overhead
 - 5. Supervisory control: Group automatic microprocessor based system.
 - 6. Motor control: AC variable voltage. Variable frequency microprocessor based with digital closed loop feedback.
 - 7. Power characteristics: 480 volts. 3-phases, 60 hertz

8. Hydraulic Power Unit: Belt Driven 120 starts per hour or direct driven submersible power unit with oil coolers.
9. Cylinder Assembly: Provide water tight sealed assembly.
10. Entrance type (passenger): Single speed center opening.
11. Entrance type (service): Two speed side opening.
12. Door protection: 3-dimensional infrared, full screen device, with differential timing, nudging and interrupted beam time.
13. Safety – Flex Clamp Type B
14. Guide Rails: Planed Steel
15. Car Enclosure (Passenger):
 - a. Steel Shell: fabricate walls of 14-gauge sheet steel, painted. Extend from floor to canopy and heavily reinforce to withstand severe service.
 - b. Front Return Panels and Integral Entrance Columns: Reinforced minimum 16-gauge stainless steel. Custom finish. Swing entire unit on substantial pivot points (minimum of 3) for service access to car operating panel(s). Locate pivot points to provide full swing of front return panel without interference with side wall finish or handrail. Secure in closed position with concealed three-point latch. Provide service compartment with recessed flush cover and cutouts for operating switches, etc.
 - c. Transom: reinforced minimum 16 gauge stainless steel full width of enclosure with cutout for car position indicator. Custom finish.
 - d. Car Door Panels: Reinforced minimum 18 gauge stainless steel. Custom finish.
 - e. Base: Stainless steel with concealed ventilation cutouts.
 - f. Interior wall finish: Custom removable panels, faced and edged with textured stainless steel.
 - g. Ventilation: Exhaust blower as required, mounted to car canopy on isolated rubber grommets.
 - h. Lighting: Provide custom LED fixtures with wiring and hook-up. Provide emergency lighting integral with portion of normal car lighting system. Include required transformer.
 - i. Suspended Ceiling: Six section (minimum), upgraded stainless steel panels.
 - j. Handrails: upgraded stainless steel as required by code.
 - k. Pads and Hooks: three-piece removable pads. Two pads covering side walls and adjacent front returns and one covering rear wall. Provide cutouts to access main car operating panel.
 - l. Battery powered emergency car lighting. Provide separate constant pressure test button in car service compartment. Illuminate portion of normal car lighting signal fixtures. LED illumination.
 - m. Vandal resistant assembly and car and hall pushbuttons
 - n. Dual car operating panels
16. Car Enclosure (Service):
 - a. Steel shell: Fabricate walls of 14-gauge sheet steel. Extend from floor to canopy and heavily reinforce to withstand severe service.
 - b. Front Return Panel: Reinforced minimum 16 gauge stainless steel. Swing entire unit on substantial pivot points (minimum 3) for service access to

- car operating panel(s). Locate pivot points to provide full swing of front return applied panel without interference with side wall finish or handrail. Secure in closed position with tamper proof fastenings. Provide service compartment with recessed flush cover and cutouts for operating switches, etc.
- c. Transom: Reinforced minimum 16 gauge stainless steel full width of enclosure with cutout for car position indicator.
 - d. Car Door Panels: Reinforced minimum 18 gauge stainless steel. Same construction as hoistway door panels.
 - e. Base: Stainless steel with concealed ventilation cutouts.
 - f. Interior Wall Finish: Removable panels, faced and edged, with textured stainless steel.
 - g. Ventilation: Exhaust blower mounted to car canopy on isolated rubber grommets.
 - h. Lighting: Provide custom LED fixtures with wiring and hook-up. Provide emergency lighting integral with portion of normal car lighting system. Include required transformer. Suspended Ceiling: Six section (minimum), upgraded stainless steel panels.
 - i. Handrails: upgraded stainless steel as required by code.
 - j. Pads and Hooks: Three-piece removable pads. Two pads covering side walls and adjacent front returns and one covering rear wall. Provide cutouts to access main car operating panel.
 - k. Battery powered emergency car lighting. Provide separate constant pressure test button in car service compartment. Illuminate portion of normal car lighting
 - l. Elevator Contractor's vandal resistant assembly for hall and car pushbutton stations:
 - m. Single car operating panel
 - n. Loading Bars: Loading Bars: Provide loading bars, 12 inches in height, the width of the rear of the cab minus 6 inches, located with a center 12 inches above the platform, and made of no less than ½" aluminum flat bar, and secured at no less than 8 places (4 upper and 4 lower) shall be placed at the rear of the cab to protect from loading impacts.
17. Car position indicators:
- a. Single digital with car direction arrows for service elevators.
 - b. Dual digital with car direction arrows for passenger elevators.
18. Communication system: self-dialing, vandal resistant, push to call, two-way communication system with emergency personnel override recall, tracking and voiceless communication
19. Make provisions for card reader and CCTV within cars
20. Gearless Traction Hoist Machines:
- a. AC induction or P.M.S.M. gearless traction type motor with auxiliary braking means, drive sheave, and deflector sheave mounted in proper alignment on a common, isolated bedplate. Provide bedplate blocking to elevate secondary or deflector sheave above machine room floor.
 - b. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.

- c. Hoist machine installations which require block-outs through machine room floor for other than hoist ropes shall be provided with a 14-gauge galvanized sheet metal enclosure over entire block-out on underside of floor slab.
 - d. Adjust the hoist machine brakes to hold 125% of the duty load. Seal brake tension and jam nuts after they are locked up tight.
21. Controllers: Group automatic, approved microprocessor-based, group dispatch with artificial intelligence car and motion control system.
22. Governors: Centrifugal-type, car driven machine room mounted with pull-through jaws and bi-directional shutdown switches. Provide required bracketing and supports for attachment to building structure.
23. Cylinder Well: Elevator Installer shall familiarize himself with existing conditions and be responsible for drilling cylinder wells.
- a. Casing: Provide steel casing, 12 inches greater in diameter than wrapped cylinder and proper depth to retain hole and provide structural integrity of PVC casing. Provide minimum 10 gauge corrosion resistant well casing; watertight joints and closed bottom. Weld seams solid at multiple casing joints. Provide a steel ring at top of casing to be keyed into pit floor. Provide watertight seal at bottom using 2 feet 0 inches thick non-shrink concrete plug of type for installation under water where drive casing is required and closed bottom casing cannot be installed.
 - b. Provide minimum 3/8 inch thick PVC or HPDE casing with watertight sealed couplings and bottom end caps. Inside diameter shall be 6 inches greater than outside diameter of cylinder. Extend PVC or HPDE above pit floor. Seal top of PVC or HPDE and provide an inspection port of 2-inch diameter by 4-inch long PVC pipe with threaded cap.
 - c. Installation: Set cylinder and PVC or HPDE casing within steel casing. Backfill between hole and steel casing with natural soils the full height of hole. Backfill between PVC or HPDE casing and steel casing with clean dry pea gravel at bottom 2'-0" of casing to stabilize PVC or HPDE with casing. Plunger and cylinder shall be plumb within 1/16 inch.
24. Cylinder: Steel pipe, factory tested for 600-pounds/square inch working pressure. Sandblast or wire brush outside of cylinder to remove rust and scale. Paint with heavy coat of epoxy or mastic. Work shall be done in shop and repaired in field if coating is damaged.
25. Plunger: Use seamless steel pipe or tubing, minimum Schedule 80. Plunger shall be no more than 0.010 inch out of round and straight within 1/16 inch. Protect during shipping and installation to avoid damage. If plunger is gouged, scarred or shows visible tool marks, it shall be replaced. Finish shall be 20 micro inches or finer. Plunger top shall be isolated from car frame. Plungers with follower guides are not acceptable.
26. Packing: Provide packing, which inhibits leaking of oil with drip ring.
27. Oil: Provide hydraulic oil or approved equal specifically designed and formulated for hydraulic elevator use.
28. Piping: Minimum Schedule 80 steel pipe suitable for 600 pounds pressure. No hoses shall be used in any part of piping. Provide sound isolating couplings in oil line between jack and pumping plant. Support piping using vibration isolating

mounts or hangers with integral felt or neoprene at least 1/4 inch thick. Use threaded or welded joints throughout except at the connections to power unit and cylinder unit. Use no more than two Victaulic type connections in the machine room and two in the pit area.

29. Pit and rupture valves: : Provide in each elevator pit a gate valve to shut off oil between cylinder and pumping plant and a pressure type line rupture safety valve to shut off oil between cylinder head and pit valve. Activation of safety valve shall not void operation of lowering valve, during normal operation.
30. Door operators: High speed, heavy-duty closed loop door operator capable of opening doors at no less than 2-1/2 f.p.s. Accomplish reversal in no more than 2-1/2" of door movement. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Maintain consistent, smooth and quiet door operation at all floors, regardless of door weight or varying air pressure.
31. Guide Assemblies: Roller type with rubber composition tires of polyurethane, minimum 3/4 inch wide and fully adjustable spring loaded to provide continuous contact with rail surfaces. Balance car to insure equal guide shoe pressure on all wheels and not exceed manufacturer's recommendations. Size: Nominal roller diameters shall be 6" for car and 3.5" for counterweight.
32. Provide necessary vibration isolation components to ensure that noise and vibration are not transmitted to the building structure.

D20 PLUMBING

D2010 Domestic Water Distribution

D2010.20 Domestic Water Equipment

- A. Description: Domestic water heater for restrooms and support spaces.
- B. Functional and Performance Requirements:
 1. The domestic water equipment for the project shall be provided in accordance with the latest codes and standards.
 2. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Applicable Components:
 1. Electric storage type domestic water heaters (DWH) Standard: UL 1453 for electric booster and commercial storage tank water heaters.
 2. DWH Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, with storage capacity.
 3. DWH Connections: ASME B1.20.1 pipe thread.
 4. DWH Pressure Rating: 150 psig (1035 kPa).
 5. DWH Heating Element: Resistance heating system.
 6. Natural Gas-Fired storage type domestic water heater (GWH) standard: ANSI Z 10.3 Gas Water Heaters Vol. III, Storage Water heaters with input ratings above 75,000 Btu/hour.

7. DWH Temperature Control: Thermostat.
8. DWH Safety Control: High-temperature-limit cutoff device or system.
9. DWH Jacket: Aluminum or steel with enameled finish or plastic.
10. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated steel bracket for wall mounting and capable of supporting water heater and water.
11. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.
12. Heat-Trap Fittings: ASHRAE 90.2.
13. Pressure-Reducing Valves: ASSE 1003 for water. Set at 25-psig- (172.5-kPa-) maximum outlet pressure unless otherwise indicated.
14. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
15. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.
16. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
17. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
18. Oilless, wet rotor domestic hot water circulator pump. Bronze casing with ceramic shaft and Noryl impeller

D2010.40 Domestic Water Piping

- A. Description: Domestic water piping system, for connection to the site water system to serve all plumbing fixtures and other equipment requiring water via city available water pressure. Piping for future reclaimed water to water closets and urinal fixtures. Hot water return system with a circulating loop and pumps with balancing valves in each major branch, Domestic hot water will be distributed throughout the space at 120°F. Hot water circulation systems with in-line circulating pumps to maintain 120°F hot water to all fixtures requiring hot water. Piping for domestic hot and cold water shall be copper tube with copper fittings.
- B. Functional and Performance Requirements:
 1. The domestic water piping for the project shall be provided in accordance with the codes and standards as referenced in Building and Site Design Criteria, Volume 1B (Plumbing).
 2. Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7 and CBC.
 3. Domestic Hot Water piping system not to exceed 3 psi/100 feet.
- C. Applicable Components:
 1. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B) water tube, drawn temper. Fittings to comply with ASME B16.18, B16.22. Flanges to comply with ASME B16.24.
 2. Soft copper tube: ASTM B 88, Type L (ASTM B 88M, Type B) water tube, annealed temper.
 3. Encasement for underground metal piping: to comply with ASTM A674 or AWWA C105.

4. Dielectric Fittings: Install dielectric fittings in piping at connections of dissimilar metal piping and tubing. Dielectric unions shall have pressure rating of 150 psig at 180 deg F. Solder joint (copper alloy) and threaded (ferrous) end connections.
5. Valves: Bronze two-piece ball valves with threaded ends.
6. Insulation for domestic hot and recirculated water shall be mineral-fiber, preformed pipe insulation, Type I. Insulation thickness shall comply with 2013 California Energy Commission, B.E.E.S., Section 120.3, Table 120.3.

D2010.60 Plumbing Fixtures

- A. Description: Plumbing fixtures and faucets for restrooms, support spaces.
- B. Functional and Performance Requirements:
 1. The fixtures for the project shall be provided in accordance with codes and standards as referenced in Building and Site Design Criteria, Volume 1B (Plumbing).
- C. Applicable Components:
 1. Lavatories: Lavatories shall be vitreous china, wall or counter mounted fixtures, with overflow and rear backsplash.
 2. Lavatory Faucets: Electric sensor operated, single control mixing or two-handle mixing valve. Faucet shall be commercial grade, chrome plated brass and faucets with two handle mixing valve shall include hot- and cold-water indicators. Provide 3/8 inch lockshield angle type supply stops with slow compression cartridge and loose key.
 3. Lavatory Under Counter Thermostatic Mixing Valves: Point of Use Type. Rough chrome plated bronze body ASSE 1016 certified under counter thermostatic mixing valve. Minimum temperature differential shall be 5°F. Adjustable temperature range shall be 85-120°F. Maximum working pressure shall be 125 psi. Valve components shall be corrosion resistant and accessible for service without disconnecting the valve from the pipeline. Materials shall be of type that prevents dezincification. Capacity: 0 to 3 gpm. Set outlet temperature at 95°F. Provide at all lavatory faucet locations.
 4. Water Closets: Wall mounted, sensor operated flush valve ADA and non-ADA type. Toilet seats to be white heavy solid plastic elongated type seats with integral molded brass or stainless steel check hinges.
 5. Urinals: Wall mounted back outlet, vitreous china fixture designed for 1/8th gallon per flush flushometer valve operation.
 6. Chilled Drinking Water Dispenser: Hi and Lo dual type bowl with bottle filler and with built in water cooler. ADA type. Gooseneck spout with lever handle, flow control.
 7. Mop Sinks: Fixtures: Flush-to-wall, floor-mounting, precast terrazzo fixture with rim guard. Precast terrazzo service basin with galvanized bonderized steel wall flanges on sides as required, stainless steel or cast aluminum protective caps on exposed curbs and three (3) inch CP brass drain cast integral. Provide wall-mounted combination faucet in rough chrome with four (4) inch wrist blade handles, integral stops, wall brace, pail hook, ¾ inch hose thread end, and vacuum breaker, modified with 30-inch plain end rubber hose with wall bracket.

8. Waste Outlets: Three (3) inch waste outlet with removable stainless steel grid strainer plate.
9. Hose Bibbs: to be provided with integral vacuum breakers provided for maintenance and wash down purposes in Restrooms, at exterior walls of the building and Concessions.

D2010.90 Domestic Water Distribution Supplementary Components

- A. Description: Domestic water piping vibration isolation
- B. Functional and Performance Requirements:
 1. Vibration isolate plumbing piping from the building structure whenever the piping is located within walls or ceilings of rooms with a background noise level of NC 35 or lower.
 2. Water flow noise in plumbing piping shall not be audible within rooms.
- C. Applicable Components:
 1. ¼- to ½-inch thick felt or neoprene (45 durometer) lined clamps.
 2. Holdrite silencer system.

D2020 Sanitary Drainage

D2020.30 Sanitary Sewerage Piping

- A. Description: Sanitary drains from waste fixtures to drain by gravity and connect into site sanitary system.
- B. Functional and Performance Requirements:
 1. The sanitary sewerage piping for the project shall be provided in accordance with codes and standards as referenced in Building and Site Design Criteria, Volume 1B (Plumbing).
 2. Soil, Waste, and Vent Piping components and installation shall be capable of withstanding a minimum working pressure of 10-foot head of water (30 kPa), unless otherwise indicated:
 3. Sanitary drains shall run at a minimum of 2% slope.
 4. Grease waste piping shall be run at a minimum slope required to maintain 4 fps velocity for suspension of fats, oils and grease from kitchen operations.
 5. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."
- C. Applicable Components:
 1. Hubless, Cast-Iron Soil Pipe & Fittings: ASTM A 888 or CISPI 301
 2. Heavy-duty, Shielded, Stainless-Steel Couplings : ASTM C 1277
 3. Hub and Spigot, Cast-Iron Soil Pipe & Fittings: ASTM A 74, Service Weight with ASTM C564 rubber gaskets.

4. Floor drains shall be ASME A112.6.3 cast iron, bottom outlet drain with round or square polished nickel bronze top. Floor drains located in mechanical spaces shall be heavy duty cast iron type drains.
5. Floor sinks shall be cast iron, bottom outlet drain with square opening and enameled interior. Floor sinks shall have $\frac{1}{2}$ or $\frac{3}{4}$ grate and shall be located in kitchen/food service areas.
6. Trench drains shall be stainless steel, bottom outlet and provided with heel-proof grate.
7. Cleanouts shall consist of exposed metal cleanouts and wall cleanouts and shall be ASME A112.36.2M for cast iron cast-iron. Cleanouts shall be provided with threaded raised-head brass closure plug. Wall cleanouts shall be provided with flat, chrome plated brass cover plate with screw. Floor cleanouts shall be provided with polished bronze frame and cover.
8. Grease Interceptors: Fiberglass, to be appropriately sized based on anticipated usage and flow rates to meet applicable sanitary sewer discharge limits, including municipal by-laws.
9. Include grease interceptor access ways, tanks, and piping or openings to retain grease and to permit wastewater flow.
10. Grease interceptors to have PVC cement welded type socket ports, or straight pipe, fitted into interceptor walls for each pipe connection.
11. Grease interceptors shall have factory manufactured access way extension collar with fiberglass risers (EC2), 24-inch (610 mm).
12. Grease interceptor access way frames and covers shall be round with non-slip cover finish, gasketed and non-vented top design.
13. Grease interceptor cover shall be cast iron: AASHTO M306 traffic load rated, 24-inch (610 mm) diameter cover with 0.25" (6 mm) gasket, two closed pickholes, non-bolted or bolted option (ASTM A48 CL35B)

D2030 Building Support Plumbing Systems

D2030.20 Stormwater Drainage Piping

- A. Description: Storm drain from roof of ISD/Probation building to drain by gravity and connect into site stormwater drainage system.
- B. Functional and Performance Requirements:
 1. The stormwater drainage piping for the project shall be provided in accordance with codes and standards as referenced in Building and Site Design Criteria, Volume 1B (Plumbing).
 2. Storm drains shall run at a minimum of 2% slope.
- C. Applicable Components:
 1. Service weight cast iron hub and spigot soil pipe and drainage fittings, or galvanized steel pipe with galvanized threaded cast iron drainage fittings, or grooved end galvanized malleable iron fittings with rubber sealing gaskets for grooved end pipe, equal to Victaulic Style 75 or 77. Hub-and-spigot, cast-iron soil pipe and fittings to comply with ASTM A 74.

D2030.40 Natural Gas Systems

- A. Description: Piping, valves, pressure regulators and specialties required to supply building with natural gas.
- B. Functional and Performance Requirements:
 - 1. Natural Gas systems for the project shall be provided in accordance with the latest codes & standards as referenced in the narrative.
 - 2. Natural Gas shall be regulated on the downstream side of the meter to a maximum of 5 psig and routed inside the building above grade where it will continue to the appliance(s) being served where the pressure will be regulated to a maximum of 7-14 inches of water column.
- C. Applicable Components:
 - 1. Line Pressure Regulators shall comply with ANSI Z21.80 and shall be single stage and suitable for natural gas. Construction shall be steel jacket with corrosion-resistant components. Provided downstream of gas meter by design-builder.
 - 2. Appliance Pressure Regulators shall comply with ANSI Z21.18. Construction shall be Die-cast aluminum. Diaphragm and springs shall be zinc-plated steel and springs shall be interchangeable. Seat disc shall be nitrile rubber and seal plug shall be ultraviolet-stabilized, mineral-filled nylon. Regulator may include vent limiting device, instead of vent connection if approved by authorities having jurisdiction. Provided by design-builder.
 - 3. Earthquake valves shall comply with ASCE 25 and shall be provided by local gas company.
 - 4. Piping for natural gas systems operating at low pressure, 0.5 psig or less installed inside buildings, use standard weight black steel pipe with 150 PSIG threaded malleable iron fittings for piping 4-inches and smaller. Provided by design-builder.
 - 5. Piping for natural gas systems operating at pressures above 3 psig installed inside buildings, use standard weight black steel pipe with all welded fittings and joints. Provided by design-builder.
 - 6. Shutoff valves for gas piping systems shall be bronze plug type valves; MSS SP-78. Body shall be bronze complying with ASTM B 584. Plug shall be bronze, with threaded or flanged ends. Valve pressure= class shall be 125 psig and shall be suitable for natural gas service with "WOG" indicated on valve body. Provided by design-builder.

D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

D3020 Heating Systems

D3020.10 Heat Generation

- A. Description:
 - 1. Heating hot water is to be generated by gas-fired condensing boilers.
 - 2. Heat generation equipment shall include boilers, trim, circulating pumps, pipework, headers and other components required for complete operation of heat generation system.

B. Functional and Performance Requirements:

1. The heat generation for the project shall be provided in accordance with latest codes & standards as referenced in the narrative.
2. Provide multiple boilers to allow for a minimum of 50% redundancy, as well as to allow for more turndown.
3. Flue venting shall be installed as per manufacturers' recommendation. Alternatively, engage a specialized draft system engineer to design engineered system for flue venting.
4. Heat generation system is to be located in an enclosed mechanical room located at the top of the building, with permanent access in order to allow future removal or replacement of boilers, as well as maintaining manufacturer's minimum clearances.
5. Manufacturers: Subject to compliance with Performance Requirements, provide one of the following:
 - i. RBI
 - ii. Approved Equal

C. Applicable Components: Gas-fired modular condensing boiler

1. Gas-fired modular pulse-combustion condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls.
2. Stainless steel heat exchanger.
3. Natural gas forced draft burner.
4. Centrifugal fan to operate during each burner firing sequence and to pre-purge and post-purge the combustion chamber.

D. Applicable Components: Flue Venting

1. Double-wall Type L metal vents rated for installation with Category IV condensing appliances. Inner shell to be Type 304 or 316 stainless steel, with a stainless steel outer jacket.

D3020.70 Decentralized Heating Equipment

A. Description:

1. VAV box heating hot water coils, duct-mounted heating hot water air coils.

B. Functional and Performance Requirements:

1. Decentralized heating shall be by hydronic hot-water distribution; use of electric reheat shall not be acceptable.
2. The decentralized heating equipment for the project shall be provided in accordance with latest codes & standards as referenced in the narrative.
3. Coils performance tested and rated according to ARI 410 and ASHRAE 33.
4. Minimum working pressure / temperature ratings: 200 psig, 325 deg F.
5. Coils shall be configured for counterflow with relationship to airflow and water flow.

6. Coils in ductwork and casings shall be installed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible". Coils in ductwork shall be independently supported.

C. Applicable Components:

1. Coils to be 5/8" ASTM B 743 copper tube with copper fins.
2. Coil control valves to be modulating type.

D3020.90 Heating System Supplementary Components

- A. Refer to Section D3050.90 for heating supplementary components.

D3030 Cooling Systems

D3030.10 Central Cooling

- A. Description: Variable-speed water-cooled centrifugal chiller.

B. Functional and Performance Requirements:

1. Chillers to comply with performance requirements in California Title-24 Building Energy Efficiency Standards, based on performance determined by ARI-550/590 ratings.
2. Chiller shall comply with ASHRAE Standards 15, 147, and 90.1
3. Provide multiple chillers to allow for a minimum of 50% redundancy, as well as to allow for minimum turndown.
4. Chillers to be installed in dedicated mechanical room, located indoors, with permanent access in order to allow future removal or replacement of all chillers and heat exchangers, as well as maintaining manufacturer's minimum clearances. Chiller room must comply with CMC Chapter 11 requirements for refrigeration machinery rooms. Equipment must be located on the same level, and preferably adjacent to Facility Management Office.
5. Chillers shall be vibration isolated.
6. Manufacturers: Subject to compliance with Performance Requirements, provide one of the following:
 - i. Trane
 - ii. York / JCI
 - iii. Approved Equal

C. Applicable Components:

1. Compressors shall be variable-speed centrifugal type. Compressors shall have oil-free technology with magnetic or roller element bearings. Casing shall be cast iron with high-strength cast aluminum impeller on carbon or alloy steel shaft. Drive shall be direct or gear-drive, open or hermetic design, using an electric motor as the driver.
2. Refrigerant shall be R-134a, R-123, or other alternative low-ODP & GWP refrigerant. Provide service valves and other factory-installed accessories required to facilitate transfer of refrigerant from chiller to a remote refrigerant storage and recycling system. Comply with requirements in ASHRAE 15 and ASHRAE 147.

3. Evaporator: shell-and-tube design, with water in tubes and refrigerant surrounding tubes within shell. Shall have sight-glass or other form of positive verification of refrigerant level.
4. Condenser: shell-and-tube design, with water in tubes and refrigerant surrounding tubes within shell. Shall have sight-glass or other form of positive verification of refrigerant level.
5. Variable frequency drive shall be factory mounted and wired on the chiller. Minimum efficiency of 96% at 60 Hz. Factory mounted active harmonic distortion filter.
6. Controls: Provide standalone microprocessor based chiller controls, including digital operator interface with graphic display. Provide interface to DDC system to enable monitoring and control of chillers.

D3030.30 Evaporative Air-Cooling

- A. Description: Induced draft counter-flow cooling towers with variable-speed tower fans.
- B. Functional and Performance Requirements:
 1. The heat generation for the project shall be provided in accordance with latest codes & standards as referenced in the narrative.
 2. Cooling tower and support structure shall withstand the effects of seismic & wind loads. Provide certificates showing seismic certification of the tower.
 3. Cooling towers shall be vibration isolated.
- C. Applicable Components: Cooling Tower
 1. Combined flow with airflow intake from the side and induced-draft, top-mounted, axial fan; and with pressurized pipe distribution.
 2. Casing, frame and hardware from galvanized steel, ASTM A 653/A 653M, G235 coating.
 3. Factory-assembled collection basin. Electronic or ultrasonic collection basin water-level controller / water makeup valve, high level and low level alarms, and corrosion-resistant water-stilling chamber.
 4. PVC fill materials suitable for entering-water temperature of up to 120 degrees.
 5. Axial fan: direct drive fan with totally enclosed variable-speed motor. Blade and hub to be aluminum or galvanized steel. Bearings designed for an L-10 life of 50,000 hours.
 6. Recirculating water distribution system with integral close-coupled pump and piping distribution system from collection basin.
 7. Factory installed control package with automatic control of tower fans and basin level controls.
 8. Factory water treatment system designed to control totally dissolved solids level and bleed rates.

D3030.70 Decentralized Cooling

- A. Description: Distributed cooling units for the following applications:
 1. Hydronic fan coil units for non-critical spaces that require dedicated cooling and/or heating during normal operating hours.

2. Split-system DX air conditioning units for critical spaces requiring after-hours or continuous cooling, including electrical rooms, IT/MPOE rooms (under 5 tons),
3. CRAC units for IT/MPOE and data rooms with a heat load of more than 5 tons.

B. Functional and Performance Requirements:

1. The HVAC heating and cooling systems for the project shall be provided in accordance with the latest codes & standards as referenced in the narrative.
2. Equipment shall be sized based on heat load calculations (refer to narrative for calculation requirements). Equipment shall be the smallest size possible to meet the calculated heat load requirements.
3. External air-conditioning condensers shall be concealed from view if located on the ground, or located on the roof.
4. Permanent access shall be provided for condensers.
5. Fan coil units, split system AC units and CRAC units shall be vibration isolated.
6. Manufacturers: Subject to compliance with Performance Requirements, provide one of the following:
 - i. Trane
 - ii. York / JCI
 - iii. Liebert
 - iv. Approved Equal

C. Applicable Components: Fan Coil Units

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel. Vertical or horizontal type as noted.
2. Insulation: Faced, glass-fiber duct liner.
3. Drain Pans: Galvanized steel, with connection for drain; insulated and complying with the latest edition of ASHRAE 62.1.
4. Refrigerant or Water Coil: Staggered copper tubing, with mechanically bonded aluminum fins. Refrigerant coils to complying with ARI 210/240 and to be provided with thermal-expansion valve.
5. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
6. Fan Motors: ECM with adjustable speed.
7. Disposable Filters: 1 inch thick, in fiberboard frames.

D. Applicable Components: Split-system air conditioning units

1. Casing to be galvanized steel, finished with corrosion inhibiting baked enamel in color selected by Architect.
2. Compressor: Hermetically sealed with crankcase heater.
3. Variable or two-speed compressor motor
4. R-410A refrigerant.
5. Copper tube coil with mechanically bonded aluminum fins,
6. Reversing valve and low-temperature air cut-off thermostat.
7. Fan: Aluminum-propeller type, directly connected to motor.
8. Motor: Permanently lubricated, with integral thermal-overload protection. Provided with heavy gauge wire fan guards.

9. Minimum Energy Efficiency: Comply with the latest edition of ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings" as well as the latest Title-24 Building Energy Efficiency Standards.

E. Applicable Components: CRAC Units

1. Self-contained, factory assembled, prewired, and prepiped; consisting of cabinet, fan, filters, and controls; for vertical floor mounting in upflow or downflow configuration.
2. Variable-capacity compressor with strainer, internal motor overload protection, resilient suspension system, and crankcase heater.
3. Remove air-cooled refrigerant condenser with integral copper-tube aluminum-fin coil with corrosion-inhibiting coating.
4. Direct-drive fan with variable speed propeller or centrifugal type type.
5. Provide airside or pumped-refrigerant economizer complying with Title-24 requirements.
6. Refrigerant: R-407C or R-410A.

D3030.90 Cooling System Supplementary Components

- A. Description: Refer to Section D3050.90 for cooling supplementary components.

D3050 Facility HVAC Distribution Systems

D3050.10 Facility Hydronic Distribution

- A. Description: Four-pipe hydronic distribution with variable-speed primary/secondary pumping system.
- B. Functional and Performance Requirements:
1. Hydronic distribution systems shall be variable flow, with the ability to ramp back pumps.
 2. Hydronic components shall be designed for complete functional operation of the system; provide all supplemental components required.
 3. Equipment shall be rated for a design pressure of at least 125 psig minimum design pressure and 375 deg F maximum operating temperatures, or 30% above the maximum operating temperatures and pressures, whichever is greater.
 4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Access shall be provided to permit valve servicing. Install drains at low points of piping system mains. Install flanges in piping NPS 2-1/2" and larger.
 5. Pumps and HVAC piping shall be vibration isolated.
- C. Applicable Components: Circulating Pumps
1. Single-stage close-coupled in-line centrifugal pumps. Pump rated for a minimum of 125-psig working pressure and a continuous water temperature of 200 deg F.
 2. Pump to operate at 1750 rpm.
 3. Motors shall be "High-Efficiency" type.

D. Applicable Components: Distribution Pumps

1. Single-stage base-mounted centrifugal pumps. Pump rated for a minimum of 125-psig working pressure and a continuous water temperature of 200 deg F.
2. Casing to be cast-iron
3. Pump to operate at 1750 rpm.
4. Motors shall be "High-Efficiency" type with variable-frequency drives.
5. Install on concrete bases with appropriate vibration isolation.
6. Install pumps with permanent clear access in order to allow future maintenance or replacement, as well as maintaining manufacturer's minimum clearances.

E. Applicable Components: Air Separator

1. Tangential or in-line coalescing air separator rated for 125-psig design pressure and 300 deg F maximum operating temperature.
2. Install air separator in suction side of distribution pumps. Install drain valve on air separators NPS 2" and larger.

F. Applicable Components: Expansion Tanks

1. Diaphragm or bladder type expansion tanks, rated for 125-psig design pressure and 375 deg F maximum operating temperature.
2. Diaphragm or bladder to be securely sealed into tank to separate air charge from system water to maintain required expansion capacity.
3. Provide with integral base mount and install expansion tank on the floor on a 4" high concrete housekeeping pad.

G. Applicable Components: Air Vents

1. Manual air vents to be bronze or cast iron, with CWP rating of 150 psig and a maximum operating temperature of 225 deg F. Install manual air vents at high points in piping, at heat transfer coils, and elsewhere as required for system air venting.
2. Automatic air vents to be bronze or cast iron, with CWP rating of 150 psig and a maximum operating temperature of 240 deg F. Install automatic air vents at high points of system piping in mechanical rooms only.

H. Applicable Components: Chemical Treatment

1. Manual bypass chemical filter feeder, sized based on total system volume, with a minimum working pressure of 125 psig.
2. Steel with corrosion-resistant exterior coating. Minimum 3-1/2" fill opening in the top.

I. Applicable Components: Pipework

1. Hydronic and condenser water pipework NPS 2" and smaller shall be Type L drawn-temper copper tubing, with wrought-copper fittings and brazed joints.
2. Hydronic and condenser water pipework NPS 2-1/2" and above shall be Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints. Grooved mechanical joint coupling, and grooved mechanical joints may be submitted as an alternative with Owner's approval.

D3050.50 HVAC Air Distribution

A. Description:

1. Supply air ducted from custom air-handling units located in mechanical rooms. Units to be variable air volume and provided with heating, cooling, filtration.
2. Ductwork to distribute from air handling units to variable air volume boxes on floors.
3. Make-up air for unconditioned spaces, as well as exhaust air, to be provided from ductwork connected to in-line centrifugal, axial, or roof-mounted fans as appropriate.

B. Functional and Performance Requirements:

1. The HVAC air distribution for the project shall be provided in accordance with latest codes & standards as referenced in the narrative.
2. Air handling units shall be fully customizable. Equipment shall allow sufficient maintenance access for filters and coils, including sufficient space to remove and replace coil.
3. All air handling units with less than 100% outdoor air shall be capable of full economizer operation.
4. Variable air volume boxes shall be provided with hot-water heating coils where installed in zones with a heating load. Install units with adequate straight lengths prior to damper, as per manufacturers' recommendations.
5. Overhead diffusers in all public areas and conference rooms shall be linear. For budgeting purposes, these linear diffusers shall approximate half of all diffusers.
6. All components shall comply with requirements for LEED prerequisites.
7. Supply air ductwork pressure class to be 2" W.C., or 50% above maximum system pressure, whichever is greater.
8. Kitchen exhaust ductwork pressure class to be negative 3" W.C. or 50% above maximum system pressure, whichever is greater.
9. Do not penetrate fire-rated assemblies with kitchen exhaust ductwork except as allowed by applicable building codes and authorities having jurisdiction.

C. Applicable Components: Central Station Air Handling Units

1. Form walls, roofs, and floors of with at least two breaks at each joint. Casings to be galvanized steel over 2" thick glass board insulation. Factory finish with standard two-coat finish; units located outdoor to be coated with 2,500 hour paint.
2. Access doors to be installed in fan section, access section, coil section, damper section and filter sections. Provide with adequate service light adjacent to access doors
3. Fan sections; provide supply and return fan sections with multiple fans mounted in a plenum fan housing. Fans to be airfoil-type centrifugal fan wheels with SWSI / DWDI construction. Motors to be totally enclosed, fan cooled, with variable frequency drives. Provide internal vibration isolation for fans.

4. Install cooling coil section and heating coil section, with heating coil located after the cooling coil. Coils to comply with ARI 410, and be totally enclosed in casing. Coil section shall allow removal and replacement of coil for maintenance, and sufficient space shall be provided in mechanical room for service, maintenance and replacement of coil. Install UVGI system next to coils.
5. Galvanized steel condensate drain pan with a 2% slope.
6. Provide outside air, return air and exhaust air motorized damper controls, along with active airflow measurement for each.
7. Filtration section: see Applicable Components: Filtration, below.
8. The indoor background noise levels generated by the building HVAC systems when combined with outdoor noise sources (environmental noise, outdoor equipment, etc.) shall produce background noise levels that do not exceed the acoustic criteria.
9. HVAC fans shall be vibration isolated.

D. Applicable Components: HVAC Fans

1. Refer to section on central-station air handling units for supply and return fans.
2. Exhaust fans shall be provided with low-leakage backdraft dampers.
3. Axial fans: tubeaxial or vaneaxial direct-drive type consisting of fan wheel and housing, factory-mounted motor, inlet cone section and accessories. Fan wheel assemblies shall be cast aluminum with airfoil-shaped blades mounted on cast-iron wheel plate.
4. In-line centrifugal fans: direct-drive type consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories. Fan wheels shall be aluminum with airfoil blades welded to an aluminum hub. Provide with variable speed controller and vibration isolators.
5. Centrifugal roof ventilators: direct or belt driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
6. Centrifugal exhaust fans: belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and support structure.
7. Exhaust fans serving Type 1 kitchen hoods to be rated for grease exhaust (UL 762 listed).

E. Applicable Components: Filtration

1. Supply air filtration shall be minimum of MERV-15.
2. Provide filter gages and differential pressure sensors across filter section, connected to BAS for remote monitoring of filter status.

F. Applicable Components: Ductwork

1. Ductwork located indoors to be single-wall rectangular, round and flat oval galvanized steel ductwork.
2. Ductwork located outdoors to be double-wall, or provided with aluminum jacketing.
3. Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

4. Ductwork fabrication, joints, elbows, transitions and other duct construction shall be fabricated in accordance with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible".
5. Flexible duct may be used for runout ducting to grilles and diffusers with a maximum length of 6 feet.
6. Fiberglass or flexible elastomeric duct liner may be used to meet the acoustical requirement.
7. Duct silencers may be used to meet the acoustical requirements.
8. Refer to Section 3050.90 Facility Distribution Systems Supplementary Components for insulation.

G. Applicable Components: Exhaust Ductwork for Kitchen Applications

1. Ductwork from Type 1 hoods to be single or double walled 316 stainless-steel factory fabricated ductwork. Factory-built ductwork shall be listed as per UL 1978.
2. Ductwork from Type 2 hoods to be single-wall 316 stainless steel.
3. Horizontal length of grease ducts shall be no longer than 75 feet and shall be provided with proper slope (not less than 2%) and fire protection system.
4. Ducts shall be provided with drains at low points for grease.
5. Access shall be provided to the duct at each level for cleaning purposes, as well as at all changes in direction, and at 12 foot intervals in horizontal ducts, or as required by code, whichever is more stringent.
6. Fire-wrap insulation for grease exhaust ducts shall be UL-Listed as well as tested and approved for use in Los Angeles County.

H. Applicable Components: Variable Air Volume (VAV) Boxes

1. Configuration: Volume-damper assembly inside unit casing with control components located inside a protective metal enclosure.
2. Galvanized steel casing with $\frac{3}{4}$ " coated fibrous-glass duct liner.
3. Galvanized steel volume damper with peripheral gasket and self-lubricating bearings.
4. Install with attenuator section where required to meet NC levels as described in the narrative.
5. Hot-Water Heating Coil: Copper tube, mechanically expanded into aluminum-plate fins; leak tested underwater to 200 psig; and factory installed.
6. DDC Controls: bidirectional damper operators and microprocessor-based controller. Damper actuator to be 24 V, powered closed / powered open.
7. Variable air volume box control to be dual-maximum type.

I. Applicable Components: Diffusers & Grilles

1. Linear slot diffusers: shall be used in public areas and conference rooms. Provide with factory-manufactured plenum box and connections where required. Custom paint finish to match ceiling.
2. Displacement diffusers: shall be used where underfloor displacement systems are utilized. Provide round induction adjustable diffusers with catch baskets.
3. Supply diffusers: round, rectangular, perforated or louver-face diffusers. Provide with plenum box where required.
4. Return grilles: adjustable bar grilles, fixed-face grilles or linear bar grilles.

D3050.90 Facility Distribution Systems Supplementary Components

A. Description:

1. Supplementary components for hydronic systems, including meters & gages, general-duty valves, hangers and supports, vibration and seismic controls, identification, testing & balancing, insulation, and controls.

B. Functional and Performance Requirements:

1. Install meters and gages to allow accurate diagnoses of pressure and temperature at all major system components.
2. Hangers and supports shall be designed to be capable of supporting combined weight of equipment components and connected systems. Where thermal movement in pipe line occurs, hanger assembly shall support pipe line in all operating conditions.
3. Structural supports, building attachments and fastener systems shall be coordinated with structural engineer. Supports wire rope, wood, chain, strap perforated bar or any other makeshift device shall not be permitted.
4. Vibration: Selection of vibration device types for mechanical equipment shall be coordinated with acoustic engineer and based on actual equipment selections.
5. Seismic Restraint Devices: Wind and seismic restraint loading values shall be as specified by project structural engineer. Provide design submittal with calculated signed by structural engineer.
6. Insulation for ductwork shall be duct wrap, complying with all relevant ASTM standards. Insulation values shall be as per the latest California Title-24 Building Energy Efficiency Standards.
7. Testing and balancing shall be in compliance with ASHRAE/IESNA 90.1. Instruments shall be properly maintained and calibrated. Testing and balancing shall meet LEED requirements for commissioning, as well as Title-24 Building Energy Efficiency Standards.

C. Applicable Components: Meters and Gages for HVAC pipework

1. Metal & plastic case liquid-in-glass thermometers. Accuracy: plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range. At a minimum, install thermometers in the inlet & outlet of each hydronic zone, pumps, boiler, chillers, AHU coils, heat exchangers, heat recovery units, cooling towers, and hydronic lines at exit of equipment rooms.
2. Pressure gages. Range: two times operating pressure. At a minimum, install pressure gages at chilled & condenser water inlets and outlets of chillers & cooling towers, suction & discharge of pumps, boilers, and heat exchanger circuits.
3. Test plugs: install at tees in piping.
4. Flowmeters: water-orifice, venturi, turbine, pitot-tube or vortex shedding type. Install flowmeters in accessible positions in pipe systems with minimum straight lengths upstream and downstream of elements, as prescribed by manufacturer's written instructions.
5. Thermal energy meters: insertion-turbine type. Install energy meters in accessible positions in pipe systems with minimum straight lengths upstream

and downstream of elements, as prescribed by manufacturer's written instructions.

D. Applicable Components: General-duty valves

1. Globe valves
2. Ball valves
3. Butterfly valves
4. Check valves
5. Gate valves
6. Plug valves

E. Applicable Components: Strainers

1. Provide strainers at the inlet to distribution pumps and chillers.

F. Applicable Components: Hangers & Supports

1. Steel pipe and duct hangers and supports shall be constructed of galvanized steel. Padded hangers with fiberglass or other pipe insulation pad or cushion shall be provided for support of bearing surface of piping
2. Fiberglass pipe and duct hangers shall be similar to steel-type, except hanger is made of fiberglass and continuous-thread rod and nuts are made of polyurethane or stainless steel.
3. Thermal-hanger shield inserts shall be used for piping operating below ambient air temperatures. 100 Psig minimum, compressive strength insulation insert encased in sheet metal shield.
4. Building attachments shall be coordinated with structural engineer. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
5. Pipe and duct stands shall be shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted ductwork.

G. Applicable Components: Vibration Isolation

1. Spring isolators shall be corrosion resistant, with neoprene acoustical base pad. Isolators shall be non-resonant with equipment forcing frequencies or support structure natural frequencies.
2. Spring hanger rod isolators shall have a spring element seated on a steel washer within a neoprene cup incorporating a rod isolation bushing. Steel retainer box encasing the spring and neoprene cup. The hanger rod shall be capable of 30-degree movement.
3. Pad-type elastomer mountings shall be designed for actual equipment loading. Pad loading shall not exceed 60 psi.
4. Vibration isolation equipment bases shall be designed for actual equipment loading. Provide either integral steel structural base, concrete inertia base, or curb-mounted base for rooftop equipment.

H. Applicable Components: Identification

1. Equipment shall be provided with metal labels (brass, 0.032-inch minimum thickness).

2. Concealed ductwork shall be provided with multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 3. Concealed pipework shall be provided with preprinted, color-coded labels with lettering indicating service (at least 1-1/2 inches high), and showing flow direction.
- I. Applicable Components: Testing & Balancing
1. All airside systems shall be tested and balanced.
 2. All hydronic systems (constant-flow and variable-flow), including boilers, chillers, heat exchangers, pumps and coils shall be tested & balanced.
 3. Engage an independent qualified TAB firm with previous experience of at least 3 similar systems of comparable size.
 4. Provide background noise level testing in accordance with the acoustic requirements.
- J. Applicable Components: Insulation
1. All hydronic piping used for heating and cooling shall be provided with insulation and jacketing. Concealed indoor piping shall be provided with FSK or AHJ jackets. Outdoor piping and piping in exposed areas shall be provided with PVC, aluminum or stainless steel jackets.
 2. Ductwork used for heating and cooling shall be provided with insulation wrap. Ductwork in exposed areas may be provided with inside lining in lieu of duct wrap.
 3. Mineral fiber insulation shall have a thermal conductivity of 0.23 Btu x in./hr. x ft. x degree F. or less.
 4. All adhesives & mastics shall be compatible with insulation materials, jackets, and substrates.
- K. Applicable Components: Instrumentation & Controls
1. The BMS Contractor shall furnish and install a complete Building Management System (BMS) for all mechanical systems and other facility systems as included in the narrative description.
 2. The BMS shall connect to the new Local Area Network (LAN) using BACnet/IP over Ethernet, hereafter referred to as the "Site Management Level".
 3. All servers, Operator Interface Workstations (OIW), Operating Systems (OS) and related applications, Communication Control Panels (CCPs) and routers shall reside on the management level. All Management Level components shall be support by a site or local Uninterruptible Power Supply (UPS).
 4. The automation level shall comprise of Direct Digital Control Panels (DDCPs) and Unitary Controllers (UC). The controllers shall be in compliance to ASHRAE SSPC/135, BACnet standards latest revision. Supervisory controllers shall reside on the Automation level. All Automation Level components shall be support by a site or local Uninterruptible Power Supply (UPS).
 5. The field level shall include all instrumentation interfaced to the automation level controllers such as temperature, humidity, level, pressure and switches, etc. It shall also include the final control elements such as the control valves,

damper actuators and control relays. All field level cables shall Plenum-type Teflon insulated (LSF - Low Smoke and Fire) rated.

6. Provide all miscellaneous low voltage field device mounting and interconnecting wiring for all Building mechanical systems.
7. Provide control power transformers/power supplies for all new equipment.
8. Provide and install proper earth ground on all BMS equipment to prevent the build-up of electromagnetic voltage potential. All BMS equipment shall be EMI immune.
9. Provide interface and integrate with third-party equipment.
10. Provide system graphics for each HVAC, electrical, plumbing, and piping system. Provide scaled floor plans indicating equipment location, service, and system data as required by this specification. Graphics to incorporate integrated points communicated via multiple sources including direct protocol integration, gateways and third – party interfaces. Origin of information shall be transparent to the operator and shall be controlled, displayed, trended, etc. as if the points were hardwired to the BMS.

D3060 Ventilation

D3060.10 Supply Air

- A. Refer to 3050.50 for supply air

D3060.20 Return Air

- A. Refer to 3050.50 for return air.

D3060.30 Exhaust Air

- A. Description:
 1. Restroom exhaust systems.
 2. Photocopy room exhaust systems.
 3. Other miscellaneous exhausts (e.g. janitor rooms, locker rooms, break rooms)
- B. Functional and Performance Requirements:
 1. Refer to 3050.50 Functional and Performance Requirements for general HVAC distribution requirements.
 2. Exhaust air ductwork pressure class to be 2" W.C., or 50% above maximum system pressure, whichever is greater.
- C. Applicable Components: Refer to 3050.50 Applicable Components

D3060.40 Outside Air

- A. Description:
 1. Outside air intakes for central station air handling units and fan coil units.
 2. Outside air or makeup air for unconditioned spaces.

- B. Functional and Performance Requirements:
 - 1. Refer to 3050.50 Functional and Performance Requirements for general HVAC distribution requirements.
 - 2. Outside air ductwork pressure class to be 2" W.C., or 50% above maximum system pressure, whichever is greater.
- C. Applicable Components: Refer to 3050.50 Applicable Components

D3060.90 Ventilation Supplementary Components

- A. Refer to Section D3050.90 for cooling supplementary components.

D40 FIRE PROTECTION

D4010 Fire Suppression

D4010.10 Water-Based Fire Suppression

- A. Description: Provide new supervised fire protection sprinkler system in new buildings.
- B. Functional and Performance Requirements:
 - 1. All fire protection work shall be in strict accordance with the current edition of California Fire Codes, NFPA 13, 24, 72, 75 and 101, California Building Codes and all authorities having jurisdiction. Modifications to the existing fire sprinkler system shall be on a separate permit by a license C16 contractor. Modifications to the existing fire alarm system shall be on a separate permit by a UL listed contractor. Provide certification to owner and authorities having jurisdiction.
 - 2. The design of the Fire Protection systems is based on NFPA 13 and the design criteria established for the specific occupancy of the facility.
 - 3. The system shall be hydraulically calculated by a licensed fire protection engineer.
 - 4. The fire protection system is the design-build contractor's responsibility.
 - 5. Coordinate work with all other trades and coordinate sprinkler head locations and piping to align neatly with lighting fixtures, speakers and diffusers, HVAC ductwork, etc.
- C. Applicable Components:
 - 1. Sprinkler heads: located in acoustical tile ceilings shall be installed in the center of the tile.
 - 2. Sprinkler heads shall be UL listed and FM approved.
 - 3. Provide quick-response type where required by authorities having jurisdiction including the following:
 - a. Gypsum board ceiling areas: submit, supply and install product, fully concealed heads with factory finished cover plate, to match adjacent ceiling surface finish paint.
 - b. Acoustical tile ceiling areas: submit, supply and install product, fully concealed heads with factory finished cover plate, to match adjacent ceiling surface finish paint. Install at center of tile.

- c. Exposed ceiling areas: supply and install building standard, pendent or upright heads.
- d. Contractor shall provide intermediate temperature sprinkler heads (175°F to 225°F) in all it rooms, machine rooms and mechanical rooms
- e. Sprinkler piping: concealed above finished ceilings and exposed in areas without finished ceiling.
- f. Sprinkler drains: drained into approved receptors.

D50 ELECTRICAL

D5000 Electrical General

D5000.10 General

- A. The design of electrical systems shall be such that all equipment shall be provided and installed complete with the highest degree of quality and workmanship in both the type of equipment and the quality of installation.
- B. The design of the electrical system shall be such that energy efficient systems and equipment are utilized to minimize the operational and maintenance cost.
- C. The design of the electrical system shall be such that it offers maximum flexibility to any future modification or remodeling without and upgrades to major electrical distribution system.
- D. The entire electrical system shall be fully rated and interrupting capacity of all equipment and its components shall exceed the available short circuit current rating by at least 10 percent. Series rating are not acceptable.
- E. Provide transient voltage suppressor where feasible to food service/kitchen equipment and other equipment serving sensitive loads.
- F. Electrical distribution system shall supply power to mechanical, plumbing, fire protection, control system, communication systems as well as all electrical components.

D5000.20 Code and Standards:

- A. All products shall conform To NEMA Standards and shall be UL Listed or CSA certified for the use of specified item.
- B. When possible, similar items shall be supplied by the same manufacturer throughout the project.
- C. All works shall comply with California Electrical Code (CEC), California Building Code (CBC), National Electrical Code (NEC) and all applicable national, state, county and local codes and standards.
- D. American Standards for Testing of Materials (ASTM) for Electrical Protective Equipment.
- E. National Fire Protection Association (NFPA) Article 70.

D5010 Facility Power Generation

D5010.10 Packaged Generator Assemblies

A. Description:

1. Provide a diesel powered, 1800 rpm, generator set, with sound attenuated weather protective housing and exhaust muffler, operated by means from one or more automatic transfer switches.
2. A 480/277V, 3-Phase, 4-Wire diesel generator system will provide emergency power to the buildings, for 72 hours with a sub-base fuel tank and a day tank. The emergency generator set will be equipped with factory installed load bank rated at 50% of the generator set capacity. The load bank will have load steps of 200KW interval with auto load controller to maintain a minimum load on the generator during under load situations. An integral generator sub-based diesel fuel storage tank will provide a minimum 48 hours fuel for continuous generator operation in case of normal power failure. A weather proof, sound attenuated enclosure with diesel particulate filter and exhaust muffler will be provided. The generator acoustic enclosure, exhaust muffler, and all other needed noise control shall reduce the generator noise to levels that comply with the City noise ordinance at all adjacent property lines.
3. Each Parcel B building(s) shall be provided with emergency generator service.
4. Provide exterior mounted connection for roll-up generator complete with non-auto transfer switch and connection to the main switchboard.

B. Functional and Performance Requirements:

1. All life safety equipment, security, telecommunication, lighting, egress lighting, fire alarm, elevators (one per bank of elevators; passenger, freight), air conditioning (backup ventilation fan for selected rooms) and all other safety and security monitoring systems will be backed up with emergency power.
2. The generator set shall be EPA approved and contractor shall obtain the operation certification from SCAQMD.
3. Roll-up Generator Termination Box: Provide means for connection of a roll-up generator on the exterior of building with non-auto ATS connection to the server. Roll-up generator termination box is intermediate termination cabinet between a temporary, portable, roll-up generator and the facility being served by the portable generator. Type NEMA 3R enclosure. 16 series male cam-locks connection shall be utilized. Line and load side mechanical alloy set screw lugs. Hinged bottom trap door for line conductor. UL 1773 – Termination box Marked “Suitable for use on the line side of service equipment” per UL 1773

C. Applicable Components:

1. Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with ASME B15.1.
3. Comply with NFPA 37, NFPA 30, NFPA 99, NFPA 110 and other applicable requirements
4. Comply with UL 2200

D5010.30 Photovoltaic Collectors

A. Description:

1. Provide Photovoltaic system for required to meet the project's sustainability goals. Provide a grid tied photovoltaic energy system including surface mounted crystalline photovoltaic panels, combiner boxes, inverters, and infrastructure support system.

B. Functional and Performance Requirements:

1. The PV system hardware and services must meet or exceed all applicable local, State and utility requirements, conform to the applicable code and standard, and have passed the listing and qualification tests, listed below:
2. IEEE 1262 – Recommended Practice for Qualification of Photovoltaic Modules.
3. PowerMark certification for PV modules.
4. IEEE Standard 928-1986 – Recommended Criteria for Terrestrial Photovoltaic Power System.
5. IEEE 1547 – Standard for interconnecting Distributed Resources with Electric Power System
6. Underwriters Laboratories 1741 - UL Standard for Inverters, Converters, Controllers and Interconnection system Equipment for use with Distributed Energy Resources.
7. Underwriters Laboratories 1703 – UL standard for Listing Photovoltaic Modules.
8. Certification of PV Equipment – All PV modules, inverters and electrical component must be listed or recognized by an appropriate and recognized United State Safety Laboratory

C. Applicable Components:

1. Provide a comprehensive "Photovoltaic Application Analysis" with a detailed description of system, application, site shading conditions and expected kw output of the roof top photovoltaic application. Utilize the Solmetric Suneye or the Solar Pathfinder shading analyzers to analyze the effects of the existing site shading conditions. Analysis must include estimated PV output in kWh per year. Coordinate rooftop application analysis with other equipment that is required to be placed on the roof to determine space available and proper solar orientation for photovoltaic equipment.
2. The contractor work responsibilities include at a minimum: system design, equipment selection and PV system installation. System must be individually capable of providing peak power output of at least proposed PV system size, 480 volt, 3-phase, 4-wire power.
3. Configure system to allow automatic operation without operator intervention. Design system and specify equipment to minimize maintenance requirements.
4. Locate the inverter (s) disconnects and associated electrical equipment in an area that is accessible, weather-protected, and secure from vandalism and personal injury.
5. Mount disconnects and over current devices in approved boxes, enclosures or panel board. Disconnects and switches must be DC rated when used in DC applications. Bond metal enclosures and boxes to the grounding conductor.

6. Layout of modules on the roof must meet the requirements of NFPA-1 including labeling, roof access and roof pathways. Coordinate roof venting requirements with fire protection engineer.
7. Provide permanent plaque or directory for power source.

D5010.60 Uninterruptable Power Systems (UPS)

A. Description:

1. A 480V-120/208V, 3-phase, 4-wire UPS system with 90 minutes battery back-up shall be allocated to all electronic security system, monitoring and telecommunications. The UPS system will be supported by emergency diesel engine generator for longer sustained operation during power outage.
2. UPS requirements and sizes shall be coordinated with the County representative and based on the actual load of systems described above.
3. ISD and Probation building will have UPS system. Extent UPS circuit to parking structure to supply security systems and gates.
4. Security system, IDF/MDF, Telecom, servers, and all other control loads identified in the architectural room data sheets shall be supplied from UPS.

B. Functional and Performance Requirements:

1. The UPS unit shall be single input requiring only one input power feeder for normal power conversion, battery charging, automatic static bypass, and maintenance bypass.
2. The UPS unit shall include internal VRLA batteries.
3. Normal Operation: The critical load shall be continuously supplied by an inverter/converter or motor/generator that maintains the specified output power quality, for the specified load conditions, independent of the input power quality, up to the specified duration for sustained loss of input power. The DC storage system shall remain charged under normal conditions and shall be automatically recharged following a brief loss of input power.
4. Automatic Bypass Operation: The critical load power shall automatically transfer from normal to bypass via a high-speed static transfer switch in the event of prolonged overload, load fault, or UPS internal failure.

C. Applicable Components:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturer experience: The manufacturer shall have a minimum of 5 years history of three phase UPS designs similar to that proposed, installed and successfully operating in the field, with references that will be provided upon request.
3. Quality System: The manufacturer shall be certified to conform to ISO 9001.

D5010.70 Transfer Switches

A. Description:

1. Automatic transfer switch shall have a minimum inherent withstand rating not less than the available short circuit, overcurrent protective coordination study and shall conform to UL 1008 for Emergency System.
2. Automatic Transfer Switch (ATS) will be equipped with bypass isolation in normal and emergency position.
3. All transfer switches shall be provided with a neutral position delay feature to delay the transfer of load from generator to normal power.

B. Functional and Performance Requirements:

1. Number of Automatic Transfer Switches (ATS's) will be allocated as follows: (1) ATS feeding all egress lighting; (1) ATS feeding all life safety equipment including smoke evacuation equipment; (1) ATS feeding security and telecommunication system; (1) ATS feeding elevators. ATS for all other critical loads such as labs.

C. Applicable Components:

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NEMA ICS 1.
3. Comply with NFPA 70-2016.
4. Comply with NFPA 99-2016.
5. Comply with NFPA 110-2016.
6. Comply with UL 1008
7. Construction: Switches shall be electrically operated and mechanically held by a single solenoid direct operating mechanism.
8. Construction: Switches shall be sized and have mechanically braced contacts to withstand momentary surge currents during transfer and retransfer.
9. Construction: Each switch shall be capable for manual operation by one person.
10. Installation: Where 4-pole switches are indicated, provide 100 percent rated neutral switching capacity with fully rated (non-overlapping) contacts.
11. Installation: Where 3-pole switches with neutral conductors are indicated, provide fully rated un-switched, solid, neutral terminal.
12. Installation: The transfer switch shall have controls to auto-start the engine generator upon power failure and to automatically shut down the engine generator upon normal power return.

D5020 Electrical Service and Distribution

D5020.10 Electrical Service

A. Description:

1. Provide 12kV NEMA 3R Switchgear, equipped with air, gas insulated power circuit breakers, utility metering and SCE required relaying as well as feeder protection relays. The main service switchgear shall be in conformance with all SCE requirements, and located within the utility yard on a concrete pad, enclosed by an architectural security wall. Maintain minimum code required clearances around the switchgear. The AIC rating of the switchgear shall meet or exceed design build team calculated values.
2. Electrical service to each building shall be 480/277V, 3-Phase, 4-Wire system via 12KV-480/277V, 3-Phase, 4-Wire pad mounted transformer(s).

B. Functional and Performance Requirements:

1. Normal power and emergency electrical source including main and distribution facilities will be physically separated by 50'-0" minimum.

C. Applicable Components:

1. Provide medium voltage cable complete with accessories.
2. Cable rated 15 KV, 3-phase, 60 hertz distribution system.
3. Cable construction in accordance with ASTM and ICEA Standards, suitable for wet and dry location and underground installation.
4. The 12kV service shall be installed in concrete encased duct banks. Manholes for 12kV service shall be positioned every 250ft or as required by the site constraints along the duct bank. The number of bends between manholes shall not exceed 360 degrees.
5. Provide High voltage warning signs throughout installation.

D5020.30 Power Distribution

A. Description:

1. A main electrical switchboard will be associated with each building in a dedicated main electrical switchgear room. For each building, an underground secondary feeder will run from the secondary transformer side to each main service switchboard.

B. Functional and Performance Requirements:

1. Power distribution from main electrical switchboard to appropriate electrical lighting panels, electrical plug loads, food service/kitchen and HVAC / Plumbing equipment.

C. Applicable Components - Main service switchboard:

1. The service switchboard shall include copper bus with bolt - on circuit breakers, fully bussed, fully rated, with AIC ratings to match or exceed the fault level to be provided by SCE and fully rated system. AIC rating shall conform to the approved Short Circuit and Overcurrent Protective Coordination Study by the Design Builder.

D. Applicable Components - Low Voltage Transformers:

1. General purpose and distribution dry type transformer shall be constructed and tested in accordance with ANSI and NEMA standards.
2. Transformer shall be low loss type with minimum efficiencies per NEMA when operated at 35 percent of full load capacity. Transformer shall be Energy Star labeled.
3. Insulation: NEMA Class H, 115-degree C rise over a 24-hour average ambient temperature of 40 degree C and all Class H materials.
4. Both primary and secondary windings shall be copper conductors. All bussing shall be copper.
5. All transformer shall have the secondary neutral brought to the terminal section for the option of multiple taps. Transformers shall be equipped with six 2-1/2 percent (2 above and 2 below normal voltage) taps.
6. Transformer for nonlinear loads shall be K-13 rated, equipped with 200 percent neutral and double sized neutral terminal.
7. Sound levels shall meet NEMA TR-27 and not to exceed the following: 0-9 kVA: 40dB; 10-50 kVA: 45dB; 51-150 kVA: 50B; 300 kVA: 55dB; 500 kVA: 60dB
8. Mounting: 1-15 kVA: Suitable for wall, floor mounting
9. Mounting: 16-75 kVA: Suitable for wall, floor, or trapeze mounting
10. Mounting: Larger the 75 kVA: Suitable for floor mounting
11. Final connections to the transformer shall be made in rigid conduit terminating with a minimum of 12 inches and not exceeding 36 inches of flexible conduit to the transformer case below the transformer core. Wire or conduit shall not come in contact with the transformer core or its mounts.
12. Provide neoprene pad or hanger type vibration isolators on all transformers. Isolators shall provide 0.20-inch minimum static deflection. Provide grossly slack flexible conduit connections to transformers.

E. Applicable Components - Panelboards:

1. Panel boards shall be fully rated with bolt on circuit breakers, copper bus, copper ground bus, and isolated ground bus. Minimum integrated short circuit as determined by Overcurrent Protective Device Coordination Study.
2. All distribution and lighting panelboards shall be located in dedicated electrical room or closets. The only exceptions are panelboards for computer rooms, and food service / kitchen areas which may be installed within that space.
3. Panelboard boxes shall be galvanized sheet metal with ample gutter space in accordance with the Code. Front door shall be of flat sheet steel finish. Doors shall be attached with concealed steel hinges and provided with a cylinder tumbler type combination catch lock and circuit directory. Boxes shall be 20" minimum wide and 5-3/4" deep.
4. 120/208 volt protective devices shall be bolt-on. Rating and number of poles shall be indicated on the drawings. Two or three pole breakers shall have one handle. Breakers shall be rated 10,000 amperes RMS.
5. 480/277 volt protective devices shall be bolt-on. Rating and number of poles shall be indicated on the drawings. Two or three pole breakers shall have one handle. Breakers shall be rated 14,000 amperes RMS at 480 volt.
6. All panelboard shall be provided with 25% spare capacity in regard to load capacity and spare circuit breaker space.

7. All panelboards shall be provided with three (3) spare conduits into the nearest accessible ceiling space for future use.
 8. All circuit breaker shall be bolt on, installed vertically at top to bottom of the panel.
 9. All busses including ground(s) and neutral shall be copper.
 10. All panel boards shall be equipped with a ground bus.
 11. In addition to regular ground bus bar, provide an isolated ground bus bar for all 120/208V panelboards.
 12. Distribution system for food service / kitchen shall have stainless steel enclosures.
- F. Applicable Components - Switchboards and Distribution Boards:
1. The entire switchboard and distribution board shall be of unit construction with all parts designed, manufactured and assembled by a single manufacturer to assure complete and proper coordination between all items.
 2. Construction and installation shall meet seismic zone requirements.
 3. Codes and Standards: The design of all current carrying devices or parts of switchboards/distribution board shall conform to the standard specified in the related sections of Underwriters Laboratories, Inc. (UL) No. UL-891 and National Electric Manufacturer's Association (NEMA).
 4. Enclosure: The switchboards / distribution boards shall be floor mounted, self-supporting, dad-front and rear, front operated, distribution type, manufactures complete with all parts, fittings and equipment, including busses, circuit breakers, barriers, terminals, wiring and connections.
 5. Enclosure: All switchboard sections shall be a minimum of 24" deep and shall be constructed of code gage steel.
 6. Enclosure: All switchboard sections shall be line up evenly, front and rear.
 7. Enclosure: All wiring gutters shall extend the full length and depth of the switchboard.
 8. Enclosure: All busses including ground and neutral shall be copper.
 9. Enclosure: Switchboard / Distribution Board shall be capable to increase the number of circuit breakers for future applications. Provide at least 35 percent additional space.
 10. Installation: Switchboard / distribution board shall be mounted on 4" high housekeeping pad. Size of pad shall be as required to meet the minimum edge distance requirements of anchor bolts.
 11. Enclosures for food service / kitchen distribution system shall be NEMA4X
- G. Applicable Components - Molded Case Circuit Breaker:
1. AIC rating shall conform to the approved Short Circuit and Overcurrent Protective Coordination Study by Design Builder.
 2. Shall have inverse time automatic tripping
 3. Field Adjustable Trip Circuit Breaker – Circuit breakers with frame sizes 400 amperes and larger shall have mechanism for adjusting long time, short time and instantaneous setting for automatic operation.
 4. Field-Changeable Ampere Rating Circuit Breaker – Circuit breaker with frame sizes 400 amperes and larger shall have changeable trip units.

5. Current Limiting Circuit Breaker: Circuit breaker indicated as current-limiting have automatically-resetting current limiting elements in each pole. Let-through Current and Energy: Less the permitted for same size Class RK-5 fuse.
 6. Solid-State Circuit Breaker: Electronic sensing, timing, and tripping circuits for adjustable current settings; instantaneous trip; and adjustable short time trip; ground fault trip with integral ground fault sensing.
- H. Applicable Components - Plug-In Busway
1. Furnish and install a plug-in busway system complete with plug-in cable tap boxes, end closures, hangers and plug-in devices as indicated on the drawings.
 2. Ampere rating, voltage and phase of busway shall be as indicated on the drawings. Neutral bus shall be full capacity.
 3. The busway shall consist of aluminum bus conductor totally enclosed and supported in a sheet steel housing.
 4. The busway shall be a 5-wire system.
 5. Busway, fittings, plug-in devices and accessories shall bear the UL label.
- I. Applicable Components - Short Circuit / Coordination Study and Arc Flash Hazard Analysis:
1. The electrical contractor shall furnish a Short Circuit and Protective device coordination study and Arc Flash hazard analysis prepared by a CA licensed electrical engineer.
 2. The studies shall include all new distribution equipment supplied by the equipment manufacturer for the project.
 3. The short circuit study and coordination study shall be performed in accordance with recommended practices and procedures set forth in ANSI/IEEE 399, ANSI/IEEE 141 and ANSI/IEEE 242.
 4. The Arch Flash Hazard Analysis shall be performed per the requirements set forth in NFPA 70E – Standard for Electrical Safety in the Workplace. The analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA 70E.

D5020.70 Facility Grounding

- A. Description: Electrical components shall be grounded in accordance with NEC, NFPA 70, UL standards and local jurisdiction.
- B. Functional and Performance Requirements:
1. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Comply with UL 467 for grounding and bonding materials and equipment and install in accordance with IEEE 142.
 3. Install grounding and bonding conductors concealed from view.
 4. All service equipment, conduit systems, supports, cabinets, equipment, fixtures, etc. and the grounded circuit conductor shall be properly grounded in accordance with the latest issue of California Electrical Code (CEC) and Los Angeles County electrical codes. Provide bonding jumpers, grounding bussing,

clamps, etc. for complete grounding. All ground clamps or such devices shall be listed for such purposes. All welded connections shall be the exothermic weld type. Set screw lugs not acceptable.

5. The grounding system shall be tested by a third party and the resistance shall be 25 ohms or less.
6. Install grounding well pipe with cover at each rod location. Install well pipe top flush with finish grade.
7. Install minimum 4 AWG bare copper wire in foundation footing.
8. Install grounding electrode conductor and connect to reinforcing steel in building columns. Electrically bond steel together.
9. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lugs, bus, or bushing.
10. Install a continuous and complete grounding electrode system using underground cold-water system and building steel. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.
11. Permanently ground entire light and power system in accordance with CEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
12. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with CEC. Install from grounding bus of servicing panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes, cable trays or metal enclosures of service equipment. Ground conduits by means of grounding bushing on termination at panelboards with installed number 12 conductor to grounding bus.
13. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with CEC.
14. Permanently attached equipment and grounding conductors prior to energizing equipment.
15. Provide ground bars in all electrical and communications rooms. Ground bars shall be copper with required insulator and stand-offs. Connect grounds for all telecommunication rooms to the main telecommunication room ground only. This ground system shall be isolated from any other grounding system except for the single connection at the main system ground.
16. All grounding conductors shall be green, except for isolated ground conductor which shall be green with yellow stripe.
17. Grounding shall be tested by an independent third-party firm.
18. Fences or walls around all electrical equipment shall be grounded.

C. Applicable Components:

1. Rigid Steel Conduit: IMC: ANSI C80.6.
2. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit. Comply with NEMA RN 1. Coating Thickness: 0.040 inch, minimum.
3. EMT: ANSI C80.3.

4. FMC: Zinc-coated steel or aluminum.
5. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
6. Install insulated equipment grounding conductors with all feeders and branch circuits.
7. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70: Feeders and branch circuits; Receptacle circuits; Single-phase motor and appliance branch circuits; Three-phase motor and appliance branch circuits.
8. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.
9. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
10. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location

D5030 General Purpose Electrical Power

D5030.10 Branch Wiring System

A. Description:

1. Branch wiring raceways to general purpose electrical power and receptacles include conduit and tubing, surface raceways, outlet boxes, pull and junction boxes and handholes.
2. Underground and Under Slab: Use rigid steel conduit, intermediate metal conduit, PVC Schedule 40 or as otherwise required to complete the work. Minimum size of conduit per CEC.
3. Conduit installed in any floor slab shall be fully coordinated with the Design Builder's Structural Engineer.
4. Outdoor locations, Above Grade: Avoid exposed conduits however where this is not possible Provide rigid steel conduit fitting. Provide cast metal or nonmetallic outlet, pull, and junction boxes.
5. Wet and Damp Locations: Provide rigid steel conduit or EMT with raintight fitting. Provide cast metal or nonmetallic outlet, pull, and junction boxes. Provide flush mounting outlet in finished areas.
6. Exposed Dry Locations: Provide rigid steel conduit or EMT where permitted by code. Provide sheet-metal boxes. Provide flush mounting outlet boxes in finished areas. Provide handled enclosure for large pull boxes.
7. Provide push button (on-off) controller for controllers.
8. Provide wiring for equipment chargers (240/120 ~ 36 VDC) as per equipment manufacturer's recommendations.

B. Functional and Performance Requirements:

1. Branch wiring system to comply with NFPA
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Copper Conductors: Comply with NEMA WC 70. The design is based on copper conductors.
4. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN, THWN, THHN-THWN-2, and XHHW.
5. Minimum Raceway Size: ½ inch for above ground installation and ¾ inch for underground installation, unless otherwise specified.
6. All surface raceway mounted in damp or wet locations or below 8 feet above finished floor shall be RGS, IMS or EMT where allowed by code. All concealed conduit above ground in the dry location shall be EMT. All underground conduits shall be non-metallic conduit.
7. Provide pull strings for all empty conduits.

C. Applicable Components: Raceways

1. Conduits to be of size based on a maximum of 40% conductor fill ratio, and to be installed according to CEC.
2. Rigid conduit, electrical metallic tubing as permitted by CEC. Flexible steel conduit shall only be used for normal system lighting whips, connections to vibrating equipment, and for seismic connections and shall not be used for the emergency system.
3. No aluminum conduit (rigid or flexible) is permitted.
4. All Electrical Metallic Tubing (EMT) fittings shall be steel compression type. Fittings for rigid conduit shall be threaded steel type. Connectors shall be insulated throat type.
5. Flexible Steel Conduit: Manufacture from single strip steel, galvanized prior to conduit fabrication. Connectors and couplings shall be single screw compression or set screw type only.
6. Flexible Liquid-tight Steel Conduit: Liquid-tight conduit shall be manufactured from a single strip steel, galvanized prior conduit fabrication, and shall be provided with an extruded polyvinyl chloride cover.
7. PVC: Heavy wall Polyvinyl Chloride Schedule 40 Conduit with solvent welded joints. Use of PVC shall be limited to underground installation at the site, encased in concrete (encasement is required for high voltage and feeder circuits cabling only).
8. Minimum size conduit per CEC.

D. Applicable Components: Wire and Cables

1. All conductors to be copper, solid for #10 AWG and smaller, stranded for #8 AWG and larger.
2. Minimum conductor size shall be No. 12 AWG.
3. All conductors larger than #4 to have Type XHHW insulation.
4. All other conductor insulation shall be Type THHN/THWN-2.
5. Factory color coding to be utilized for appropriate system voltages and phase identification.

6. All conductors shall be new and manufactured within 12 months of installation.
 7. All wiring for occupancy sensor power packs (high and low voltage) to the makeup junction box shall be in conduit.
- E. Applicable Components: Boxes
1. Sheet steel boxes shall be standard one-piece knock-out boxes. The minimum size shall be 4" square by 2 1/8" deep with adequate space for devices, wires and 30% spare fill capacity.
 2. Telephone and intercom outlets shall be a minimum of 4-11/16" square by 2-1/8" deep.
 3. Boxes utilized in food service / kitchen shall have stainless steel covers.
 4. Fire Alarm boxes shall be 4" square with plaster rings to suit type of devices.
- F. Applicable Components: Underground Conduits and Duct Banks
1. Underground conduits without concrete encasements shall be galvanized rigid steel.
 2. Concrete encased underground conduits shall be installed in accordance with the recommendation set forth in NEMA Bulletin.
 3. Provide concrete encasement for conduits for 12kV duct banks. The concrete shall have a minimum compressive strength of 2,500 psi and shall be color red.
 4. Conduits shall terminate in end bells where duct line enter manholes or handholes.
 5. Changes in direction in the duct banks shall be accomplished by using long sweep bend with a minimum radius of curvature of 25 ft. or manufactured sweeps with a 150in. radius.
 6. Conduit spacers for duct banks shall be in the plastic interlocking type and shall be placed at not more than 5 feet intervals along the duct bank. Spacers shall be secured to prevent movement of conduits during the pouring of concrete.
 7. Use rigid steel conduit for stub-ups and risers to grade from other conduits. Cap all stub-ups for future use.
- G. Applicable Components: Manholes and Handholes
1. The manhole and handholes shall be the precast type complete with traffic covers, ladders pulling irons, sumps, cable support racks, etc.
 2. Manhole and handholes shall be placed on a 6" base compacted sands or gravel to assure uniform distribution of soil pressure on the floor.
 3. Surfaces between sections of manholes and handholes shall be cleaned and gasketed and watertight. All outside surfaces shall be coated with an approved waterproofing compound.
 4. The top of manholes and handholes shall align with the finished surface where they installed.
 5. Manholes shall have traffic rated covers, secured to be vandal proof.
 6. Provide high voltage warning signage.
- H. Applicable Components: Outlet and Junction Boxes
1. Provide boxes in the wiring or raceway systems wherever required for pulling of wires, making connections or mounting of devices or fixtures. Each box shall

have the volume required by code for number of conductors enclosed in the box.

2. Boxes installed in wet location or outdoor shall be the cast metal hub type, complete with gaskets and covers. Boxes in other location shall be galvanized, sheet steel knock-out type.
3. Sheet steel boxes shall not be less than 4" square and 1 ½" deep. Boxes installed for concealed wiring shall be provided with suitable switch or plaster rings as required by the devices to be served. Where the boxes are surface mounted, they shall be fitted with suitable raised or blank covers.
4. Recessed boxes in stud partitions or suspended ceiling shall be supported with galvanized steel box hangers of type made specially for the purpose or attached directly to support structure members.
5. Use outlet boxes serving fixtures or devices as pull boxes wherever practicable. In finish areas, provide pull or junction boxes only as directed.
6. Unless otherwise indicated, all wall outlet boxes shall be flush mounted in areas with finish walls.
7. Use solid type ganged boxes where required for more than two devices.
8. Boxes used in concrete, masonry or tile shall be of the type designed for use in those installations.
9. Switch and plaster rind shall be such that they are flush to no more than 1/8" behind the surface of the finished wall or ceiling.
10. The mounting height of wall outlets shall be measured from the finish floor to the center of the wall outlet. Unless otherwise indicated, the mounting heights of the wall outlets as follows:

Convenience receptacle	18 inches
Switch for light control	46 inches
Receptacle over counter	48 inches
Telephone or Data outlet	18 inches
Thermostat, fire alarm manual station	48 inches

I. Applicable Components: Pull Boxes

1. Pull boxes shall be installed in all conduit runs wherever indicated or where necessary in order to facilitate the pulling of wires or cable or as required to comply with the code requirements.
2. All pull boxes shall be constructed of code gauge steel and sized as indicated on the drawings or required by code. Pull boxes shall be provided with removable covers secured by machine screws.
3. All surfaces of boxes and covers, inside and out shall have a rust inhibitor prime coat and baked on gray enamel finish coat.

J. Applicable Components: Wireways

1. Wireways shall be hinge cover and shall be constructed and installed so that electrical and mechanical continuity of the complete wireway system is secured.
2. Applicable Components: Cable Trays
3. Cable tray shall consist of galvanized steel ladder type, NEMA Class 12C, minimum of 6 inches deep by 12 inches wide.

4. Securely fasten cable tray to structural members.
5. System shall use standard pre-fabricated elbows, reducers, crossover, tees, and elevation change tray as required.
6. Provide fire barriers where cable trays penetrate fire rated building component. Fire wall penetrations must be sealed with an approved designed-tested fire stopping system installed in accordance with manufacturer's instructions.
7. Provide a bare copper #2 AWG, insulated copper ground conductor in each cable tray. Connect each section of cable tray to the ground connector.
8. Tray shall be supported by cantilever bracket, trapeze or individual rod suspension. Support shall be installed on five foot centers maximum. A support shall be placed within two feet on each side on any connection to a fitting.
9. All power feeds crossing the path of the cable tray at right angles should be a minimum of 6 inches in distance from the cable tray in order to prevent problems with high speed data transmissions.
10. A minimum of 12 inches access headroom shall be provided and maintained above the complete cable tray system. Cable trays must have adequate side access for initial cable installation and for future cable adds, moves and changes.

D5030.50 Wiring Devices

- A. Description: Wiring devices includes wall switches, wall dimmers, receptacles, multi-outlet assembly, device plates and decorative box cover.
- B. Functional and Performance Requirements:
 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 2. Comply with NFPA 70-2016.
 3. All 120 volt, 1 phase, 15 and 20 ampere receptacles installed outdoors with direct grade level access, on roof and in bathrooms shall have ground fault circuit interrupter protection for personnel. This protection shall be provided by using either ground fault circuit breakers or GFCI receptacles.
- C. Applicable Components: Wall Switches
 1. Wall switches shall be fully enclosed, quite-operating flush toggle type switches for back and side wiring.
 2. NEMA WD 1, Industrial, Heavy-Duty, Specification Grade, AC only general use snap switch.
 3. Body and handle: For emergency power color to be red.
 4. Indicator Light: Lighted handle type switch. Provide red color for emergency and green color for normal power circuits.
 5. Locator Light: Lighted handle type switch; clear color handle.
 6. Voltage Rating: 120-277 volts, AC
 7. Current Rating: 20 amperes

D. Applicable Components: Manual Wall Dimmers

1. Dimmers shall be 120 or 277 volts as required for circuit wiring. Rating shall be based on quantity of lamps controlled.
2. NEMA WD 1, Type 1 electronic dimmer for LED lamps. Coordinate ballast and driver type.
3. Provide dimmer suitable for application
4. Body and handle: Plastic with linear slide. For emergency power color to be red.
5. Voltage: 120/277 volts
6. Accessory Wall Switch: match dimmer appearance.

E. Applicable Components: Receptacles

1. Receptacles shall be NEMA 5-20R, rated for 20A, 125 volts, heavy duty specification grade.
2. Receptacle shall not be connected for feed through, pigtailed in box for circuit continuation.
3. Receptacle on emergency power shall be red.
4. GFCI Receptacle: For outdoor or within 6 feet of sink shall be ground fault circuit interrupter type. GFCI shall be 20 amperes, 120 volt, duplex, three wire grounding with test and reset button.
5. Provide one isolated ground duplex outlet at each area where there is a telephone/data outlet. Isolated ground wire shall be used only for other isolated ground receptacle outlets and separate from other convenient receptacles ground wires. Isolated ground receptacle outlet shall be color orange.
6. A maximum of six (6) convenience receptacles will be allowed on each 20 amp circuit. Provide dedicated circuit for all copiers, printers, microwaves, coffee machines, refrigerators, garbage disposal and vending machines. Provide dedicated circuits for equipment requested by end users.
7. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
8. Twist-Locking Receptacles: 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.
9. All 120 volt, single phase, 15 and 20 ampere receptacles shall be GFCI type with stainless steel covers.

F. Applicable Components: Wall Plates

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Steel with white baked enamel, suitable for field painting. Smooth, high-impact thermoplastic 0.035-inch-thick, satin-finished stainless steel 0.04-inch-thick, brushed brass with factory polymer finish 0.05-inch-thick anodized aluminum 0.04-inch-thick steel with chrome-plated finish.
3. Material for Unfinished Spaces: High-impact thermoplastic.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
5. For receptacles with other than 120 volt, inscribe voltage available.
6. For receptacles served by emergency circuit, inscribe "Emergency."
7. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

G. Applicable Components: Occupancy Sensors -Wall Switch Sensor

1. Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft.
2. Adaptive-technology type, 120/277 V, adjustable time delay up to 20 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft.
3. Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, with a minimum coverage area of 1200 sq. ft.
4. Dual technology, with both passive-infrared- and ultrasonic-type sensing, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, and a minimum coverage area of 1200 sq. ft.
5. Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 150-degree field of view, with a minimum coverage area of 1200 sq. ft.

H. Applicable Components - Occupancy Sensors: Exterior Occupancy Sensors:

1. Passive-infrared type, 120/277 V, weatherproof, adjustable time delay up to 15 minutes, 180-degree field of view, and 110-foot detection range.

I. Applicable Components: Floor Service Fittings

1. Type: Modular, flush-type, dual-service units suitable for wiring method used.
2. Compartments: Barrier separates power from voice and data communication cabling.
3. Power Receptacle: NEMA WD 6 configuration 5-20R.
4. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 Category 5e jacks for UTP cable.
5. Flush Floor type: Single core, 3 inch hole, (1) 20A duplex receptacle, device shall have cover to protect outlet, flange and outlet cover assembly shall be gray, black or brass finish.
6. Quadruplex power outlet: Single core, 3 inch hole, (2) 15A duplex receptacle, device shall have cover to protect outlet, flange and outlet cover assembly shall be gray, black or brass finish.
7. Communication: Single core, 3 inch hole, accept up to four (4) category 5 and two (2) category 3 connectors, flange and outlet cover assembly shall be gray, black or brass finish.
8. Electrical furniture feed: Single core, 3 inch hole, furniture feed unit with (2) ½ inch and (1) ¾ inch conduit adapter, flange and outlet cover assembly shall be gray, black or brass finish.

J. Applicable Components: Poke-Through Assemblies

1. Factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
2. Service Outlet Assembly: Flush type with four simplex receptacles and space for four RJ-45 jacks.
3. Size: Selected to fit nominal 3-inch, 4-inch, 6- inch, cored holes in floor and matched to floor thickness.
4. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.

5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of two four, 4-pair, Category 5e voice and data communication cables

D5040 Lighting

D5040.10 Lighting Control

- A. Description: Provide a complete lighting control system per the narrative requirements and as required to complete the work. Lighting control system shall be integrated, energy saving lighting control system including Lighting Control Panels, Occupancy Sensors, and Daylighting control from a single supplier. All work is subject to the review and approval of the County's Representative.
- B. Functional and Performance Requirements:
 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Applicable Components - Outdoor Photoelectric Switches:
 1. Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off. Time Delay: 15-second minimum, to prevent false operation.
 2. Solid state, with SPST DPST dry contacts rated for 1800 VA to operate connected load, relay, or contactor coils; complying with UL 773. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range. Time Delay: 30-second minimum, to prevent false operation.
- D. Applicable Components: Indoor Photoelectric Switches
 1. Ceiling-Mounted Photoelectric Switch: Solid-state, light-level sensor unit, with separate relay unit mounted on luminaire, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.
 2. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 4. Light-Level Monitoring Range: 10 to 200 fc, with an adjustment for turn-on and turn-off levels within that range.

5. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
 6. Indicator: Two LEDs to indicate the beginning of on-off cycles.
- E. Applicable Components: Daylight-Harvesting Switching Controls
1. Ceiling-Mounted Switching Controls: Solid-state, light-level sensor unit, with separate power pack mounted on luminaire, to detect changes in indoor lighting levels that are perceived by the eye.
 2. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
 4. Sensor Output: Contacts rated to operate the associated power pack, complying with UL 773A. Sensor is powered by the power pack.
 5. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 6. General Space Sensors Light-Level Monitoring Range: 10 to 200 fc, with an adjustment for turn-on and turn-off levels within that range.
 7. Atrium Space Sensors Light-Level Monitoring Range: 100 to 1000 fc, with an adjustment for turn-on and turn-off levels within that range.
 8. Skylight Sensors Light-Level Monitoring Range: 1000 to 10,000 fc, with an adjustment for turn-on and turn-off levels within that range.
 9. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling.
 10. Set-Point Adjustment: Equip with deadband adjustment of 25, 50, and 75 percent above the "on" set point, or provide with separate adjustable "on" and "off" set points.
 11. Test Mode: User selectable, overriding programmed time delay to allow settings check.
 12. Control Load Status: User selectable to confirm that load wiring is correct.
 13. Indicator: Two digital displays to indicate the beginning of on-off cycles.
- F. Applicable Components - Daylight-Harvesting Dimming Controls
1. System Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, the lights are dimmed. Lighting control set point is based on two lighting conditions: When no daylight is present (target level); When significant daylight is present.
 2. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit, with separate controller unit, to detect changes in lighting levels that are perceived by the eye. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. Sensor Output: 0- to 10-V dc to operate electronic dimming ballasts. Sensor is powered by controller unit.
 4. Power Pack: Sensor has 24-V dc, Class 2 power source, as defined by NFPA 70.
 5. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc.
- G. Applicable Components: Indoor Occupancy Sensors
1. General Description for Sensors: Wall- or ceiling-mounting, solid-state indoor occupancy sensors with a separate power pack.

2. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
4. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
5. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
6. Mounting Sensor: Suitable for mounting in any position on a standard outlet box.
7. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
8. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
9. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
10. Bypass Switch: Override the on function in case of sensor failure.
11. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; keep lighting off when selected lighting level is present.
12. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.
13. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in.
14. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
15. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot-high ceiling.
16. Ultrasonic Type: Ceiling mounting; detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage.
17. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.

H. Applicable Components – Detection Coverage:

1. Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96-inch-high ceiling.
2. Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
3. Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96-inch-high ceiling.
4. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet when mounted on a 10-foot-high ceiling in a corridor not wider than 14 feet.
5. Dual-Technology Type: Ceiling mounting; detect occupancy in coverage area using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operating controls on unit.

6. Sensitivity Adjustment: Separate for each sensing technology.
 7. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
 8. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling
- I. Applicable Components - Switchbox Mounted Occupancy Sensors: General Requirements for Sensors:
1. Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
 2. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application, and shall comply with California Title 24.
 3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
 4. Switch Rating: Not less than 800-VA at 120 V, 1200-VA at 277 V
- J. Applicable Components: Switchbox Mounted Occupancy Sensors: Wall-Switch Sensor Tag WS1
1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft. 2100 sq. ft.
 2. Sensing Technology: PIR Dual technology - PIR and ultrasonic.
 3. Switch Type: SP. SP, dual circuit. SP, manual "on," automatic "off."
 4. Voltage: 120 V 277 V Dual voltage, 120 and 277 V; passive-infrared dual-technology type.
 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
 6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
 7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
 8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
- K. Applicable Components: Switchbox Mounted Occupancy Sensors: Wall-Switch Sensor Tag WS2
1. Standard Range: 210-degree field of view, with a minimum coverage area of 900 sq. ft.
 2. Sensing Technology: PIR.
 3. Switch Type: SP. SP, dual circuit. SP, manual "on," automatic "off." SP, field selectable automatic "on," or manual "on" automatic "off."
 4. Voltage: 120 V 277 V Dual voltage, 120 and 277 V; passive-infrared dual-technology type.
 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
 6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
 7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.

8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
- L. Applicable Components: Outdoor Motion Sensor (PIR)
1. Performance Requirements: Suitable for operation in ambient temperatures ranging from minus 40 to plus 130 deg F, rated as raintight according to UL 773A.
 2. Operation: Turn lights on when sensing infrared energy changes between background and moving body in area of coverage; with a time-delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 3. Automatic Light-Level Sensor: Adjustable from 1 to 20 fc; keep lighting off during daylight hours.
 4. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in.
 5. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 6. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
- M. Applicable Components: Lighting Contactors
1. Description: Electrically operated and electrically held, combination type with non-fused disconnect, complying with NEMA ICS 2 and UL 508.
 2. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 3. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 4. Enclosure: Comply with NEMA 250.
 5. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.
 6. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.
 7. Monitoring: On-off status.
- N. Applicable Components: Emergency Shunt Relay
1. Description: Normally closed, electrically held relay, arranged for wiring in parallel with automatic switching contacts; complying with UL 924.
 2. Coil Rating: 120 or 277 V as required.
- O. Applicable Components: Conductors and Cables
1. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG.
 2. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

D5040.20 Branch Wiring for Lighting

A. Description:

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70-2016.
3. Branch wiring raceways to electrical lighting power include conduit and tubing, surface raceways, outlet boxes, pull and junction boxes.
4. Conduit shall not be installed in any floor slab.
5. Outdoor locations, Above Grade: Provide rigid steel conduit or EMT with raintight fitting. Provide cast metal or nonmetallic outlet, pull, and junction boxes.
6. Wet and Damp Locations: Provide rigid steel conduit. Provide cast metal or nonmetallic outlet, pull, and junction boxes. Provide flush mounting outlet in finished areas.
7. Exposed Dry Locations: Provide rigid steel conduit or EMT where permitted by code. Provide sheet-metal boxes. Provide flush mounting outlet boxes in finished areas. Provide handled enclosure for large pull boxes.

B. Functional and Performance Requirements:

1. Branch wiring system to comply with NFPA
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Copper Conductors: Comply with NEMA WC 70. The design is based on copper conductors.
4. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN, THWN, THHN-THWN-2, and XHHW.
5. Minimum Raceway Size: ½ inch for above ground installation and ¾ inch for underground installation, unless otherwise specified.
6. All surface raceway mounted in damp or wet locations or below 8 feet above finished floor shall be RGS, IMS or EMT where allowed by code. All concealed conduit above ground in the dry location shall be EMT. All underground conduits shall be non-metallic conduit.
7. Provide pull strings for all empty conduits.

D5040.50 Lighting Fixtures

A. Description: Provide lighting fixtures as follows:

1. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Comply with NFPA 70.
4. A constant light system shall use automatic power adjustment to achieve a lumen maintenance control strategy as describe in the IESNA Lighting Handbook 9th Edition Lighting Controls Section pages 27-2 and 27-3: "Lumen maintenance control strategy calls for reducing the initial illumination of a new system to the designed minimum level. As lumens depreciation occurs, more power is applied to the lamps in order to maintain constant output.
5. The exterior lighting system including landscape shall consist of energy efficient fixtures along with the use of lighting control devices. The poles and other support structures, brackets, arms, bases, anchorages and foundations shall withstand up to 110 mph wind or based on the latest edition of the California Building Code.
6. Structural Analysis Criteria for Pole Selections:
 - a. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4.
 - b. Live Load: Single load of 500 lbf (2224 N), distributed as stated in AASHTO LTS-4.
 - c. Wind Load: Pressure of wind on pole and luminaire, calculated and applied as stated in AASHTO LTS-4.
 - d. Wind speed for calculating wind load for poles is 90 MPH (113 km/h).

B. Functional and Performance Requirements: Solid State LED Lighting Fixture Quality Requirements:

1. Luminaire manufacturer shall have a minimum of five (5) years' experience in the manufacture and design of LED products and systems and no less than one hundred (100) North American installations.
2. Unless otherwise specified, all LED luminaires and power/data supplies shall be provided by a single manufacturer to ensure compatibility.
3. All components, peripheral devices and control software are to be provided by and shall be the responsibility of a single entity. All components shall perform successfully as a complete system.
4. Include all components necessary for a complete installation. Provide all power supplies, synchronizers, data cables, and data terminators for a complete working system.
5. All LED sources used in the LED luminaire shall be of proven quality from established and reputable LED manufacturers and shall have been fabricated after 2015. Acceptable LED lamp manufacturers unless otherwise noted are:

6. Manufacturers of LED equipment and lighting shall provide written guarantee of the following:
 - a. Manufacturer will keep record of original bin for each LED module and have replacement modules from the same bin available for three (3) years after date of installation.
 - b. Manufacturer will keep an inventory of replacement parts (source assembly, power and control components).
 - c. Manufacturer's LED system will not become obsolete for ten (10) years: Manufacturer will provide exact replacement parts, or provide upgraded parts that are designed to fit into the original luminaire and provide equivalent distribution and lumen output to the original, without any negative consequences.
 - d. System shall carry a full warranty for five (5) years. Manufacturer shall be responsible for cost of labor, and cost of shipping, to replace any component of the system that fails within 2 years of installation.
- C. Products and Components: Performance
 1. LED luminaires and components shall be UL listed or UL classified.
 2. All LED luminaires shall be subjected to the following JEDEC Reliability Tests for Lead-free Semiconductors: HTOL, RTOL, LTOL, PTMCL, TMSK, Mechanical Shock, Variable Vibration Frequency, SHR, Autoclave.
 3. To ensure luminaire quality, luminaire shall have been tested under accelerated life test conditions including an operating temperature span of 360 degrees F, and cyclic loading up to 60G.
 4. All LED components shall be mercury and lead-free.
 5. All manufacturing processes and materials shall conform to the requirements of the European Union's Restriction on the Use of Hazardous Substances in Electrical and Electronics Equipment (RoHS) Directive, 2002/95/EC.
 6. LEDs shall comply with ANSI/NEMA/ANSI C78.377-2008 – Specifications for the Chromaticity of Solid State Lighting Products. Color shall remain stable throughout the life of the lamp. Color shall match approved sample.
 7. LEDs shall comply with IESNA LM-80 – Standards for Lumen Maintenance of LED Lighting Products
 8. White LEDs shall have a rated source life of 50,000 hours under normal operating conditions. RGB LEDs shall have a rated source life of 100,000 hours. LED "rated source life" is defined as the time when a minimum of 70% of initial lumen output remains.
 9. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
 10. Metal Parts: Free of burrs and sharp corners and edges.
 11. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
 12. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit re-lamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during re-lamping and when secured in operating position.

13. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - a. White Surfaces: 85 percent.
 - b. Specular Surfaces: 83 percent.
 - c. Diffusing Specular Surfaces: 75 percent.
 - d. Laminated Silver Metallized Film: 90 percent.
14. Plastic Diffusers, Covers, and Globes:
 - a. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - b. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is indicated.
 - c. UV stabilized.
 - d. Glass: Annealed crystal glass, unless otherwise indicated.
15. Factory Applied Labels:
 - a. Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place. Label shall include following lamp and ballast characteristics:
 - b. USE ONLY" and include specific lamp type.
 - c. Lamp diameter or shape code (A/T/MR PAR, etc.).
 - d. CCT and CRI for all luminaires

D. Applicable Components: Interior Luminaire

1. LED luminaires and components shall be UL listed or UL classified.
2. All LED luminaires shall be subjected to the following JEDEC Reliability Tests for Lead-free Semiconductors: HTOL, RTOL, LTOL, PTMCL, TMSK, Mechanical Shock, Variable Vibration Frequency, SHR, Autoclave.
3. To ensure luminaire quality, luminaire shall have been tested under accelerated life test conditions including an operating temperature span of 360 degrees F, and cyclic loading up to 60G.
4. All LED components shall be mercury and lead-free.
5. All manufacturing processes and materials shall conform to the requirements of the European Union's Restriction on the Use of Hazardous Substances in Electrical and Electronics Equipment (RoHS) Directive, 2002/95/EC.
6. LEDs shall comply with ANSI/NEMA/ANSI C78.377-2008 – Specifications for the Chromaticity of Solid State Lighting Products. Color shall remain stable throughout the life of the lamp. Color shall match approved sample.
7. LEDs shall comply with IESNA LM-80 – Standards for Lumen Maintenance of LED Lighting Products.
8. White LEDs shall have a rated source life of 50,000 hours under normal operating conditions. RGB LEDs shall have a rated source life of 100,000 hours. LED "rated source life" is defined as the time when a minimum of 70% of initial lumen output remains.
9. Luminaire assembly shall include a method of dissipating heat so as to not degrade life of source, electronic equipment, or lenses. LED luminaire housing

shall be designed to transfer heat from the LED board to the outside environment. Luminaire housing shall have no negative impact on life of components.

10. Manufacturer shall supply in writing a range of permissible operating temperatures in which system will perform optimally.
11. High power LED luminaires shall be thermally protected using one or more of the following thermal management techniques: metal core board, gap pad, and/or internal monitoring firmware
12. LEDs shall be adequately protected from moisture or dust in interior applications.
13. For wet and damp use, LED-based luminaires itself shall be sealed, rated, and tested for appropriate environmental conditions, not accomplished by using an additional housing or enclosure. All hardwired connections to LED luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
14. All hardwired connections to LED luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
15. The LED luminaire shall be operated at constant and carefully regulated current levels. LEDs shall not be overdriven beyond their specified nominal voltage and current.
16. RGB LED luminaires shall utilize an equal combination of high brightness red, blue and green LEDs, unless otherwise noted, to provide up to 16.7 million additive RGB colors and shall be capable of at least 8-bit control.
17. Manufacturer shall be able to provide supporting documentation of the product meeting third party regulatory compliance.
18. Manufacturer shall ensure that products undergo and successfully meet appropriate design and manufacturability testing including Design FMEA, Process FMEA, Environmental Engineering Considerations and Laboratory Tests, IEC standards and UL/CE testing.
19. All LED luminaires (100% of each lot) shall undergo a minimum twenty-four (24) hour burn-in during manufacturing, prior to shipping.
20. Manufacturer shall provide Luminaire Efficacy (lm/W), total luminous flux (lumens), luminous intensity (candelas) chromaticity coordinates, CCT and CRI. Optical performance, polar diagrams, and relevant luminance and illuminance photometric data. Provide data in IES file format in accordance with IES LM-79-2008, based on test results from an independent Nationally Recognized Testing Laboratory
21. Power / data supply shall have the following:
 - a. Supply outputs shall have current limiting protection.
 - b. Supply shall provide miswiring protection.
 - c. Supply shall have power factor correction.
 - d. Supply shall provide connections that are conduit-ready or clamp-style connections in the case of low-voltage wiring.
 - e. Supply shall come with a housing that meets a minimum IP20 rating for dry location installation unless located in a damp or wet location.
 - f. Supply shall be UL listed for Class 1 or Class 2 wiring.

E. Applicable Components: Exterior Luminaire

1. Metal Parts: Free of burrs and sharp corners and edges.
2. Sheet Metal Components: Corrosion-resistant aluminum. Form and support to prevent warping and sagging.
3. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors. Diffusers and Lenses:
4. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
5. Glass: Annealed borosilicate, crystal glass unless otherwise indicated.
6. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
7. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
8. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - a. White Surfaces: 85 percent.
 - b. Specular Surfaces: 83 percent.
 - c. Diffusing Specular Surfaces: 75 percent.
9. Housings:
 - a. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
 - b. Provide filter/breather for enclosed luminaires.
10. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
11. Finishes:
 - a. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
 - b. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finishes process and color of pole or support materials.
 - c. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - d. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

F. Applicable Components: Poles and Support Component

1. Structural Characteristics: Comply with AASHTO LTS-4.
2. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in Part 1 "Structural Analysis Criteria for Pole Selection" Article, with a gust factor of 1.3.
3. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis. Strength Analysis: For each

pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

4. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts, unless otherwise indicated.
5. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
6. Materials: Shall not cause galvanic action at contact points.
7. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication, unless stainless-steel items are indicated.
8. Anchor-Bolt Template: Plywood or steel.
9. Handhole: Oval-shaped, with minimum clear opening of 2 ½ by 5 inches, with cover secured by stainless steel captive screws.
10. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange.
11. Breakaway Supports: Frangible breakaway supports, tested by an independent testing agency acceptable to authorities having jurisdiction, according to AASHTO LTS-4.

G. Applicable Components: Steel Poles

1. Poles: Comply with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig ; 1-piece construction up to 20 feet in height with access handhole in pole wall.
2. Shape: Round, straight.
3. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
4. Steel Mast Arms: Continuously welded to pole attachment plate. Material and finish same as pole.
5. Brackets for Luminaires: Detachable, cantilever, without underbrace.
6. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.
7. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire.
8. Match pole material and finish with Campus Infrastructure pole.
9. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
10. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
11. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported cable times a 5.0 safety factor.
12. Platform for Lamp and Ballast Servicing: Factory fabricated of steel with finish matching that of pole.
13. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.

14. Galvanized Finish: After fabrication, hot-dip galvanize complying with ASTM A 123/A 123M.

H. Applicable Components: Exit Signs

1. Description: Comply with UL 924; for visibility, luminance, and lettering size, comply with authorities having jurisdiction. Sign color shall be green. Verify mounting requirements of all sign locations prior to installation and ordering.
2. Internally Lighted Signs
3. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.
4. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
5. Battery: Sealed, maintenance-free, nickel-cadmium type.
6. Charger: Fully automatic, solid-state type with sealed transfer relay.
7. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
8. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
9. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
10. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
11. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

I. Applicable Components: Lighting Fixture Support Component

1. Comply with "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
2. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
3. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
4. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.
5. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
6. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
7. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
8. Individual fixtures shall carry weight of fixture to building construction, clear of ducts or pipes.
9. Provide recessed LED luminaires with structural members and leveling provisions.

10. Provide pendant-mounted fixtures with conduit stems supported to ceiling framework with self-leveling fittings.
11. All pendant mounted fixtures to contain swivel connector at canopy at plane of suspended ceiling. Pendant mounted fixtures installed in areas without suspended ceilings must be provided with flexible connection at structure to allow for lateral movement.
12. Provide minimum of 4 earthquake clips for recessed lighting fixtures installed in ceilings which meets Seismic requirements. Fixtures not installed in this type of ceiling must be independently hung from 4 points and cable braced to the deck.

D5080 Miscellaneous Electrical Systems

D5080.70 Transient Voltage Suppression

- A. Description: TVSSs shall be applied at service entrance and secondary electrical panels.
- B. Applicable Components - Service Entrance Switchboard and Switchgear Suppressors
 1. Surge Protection Device Description: Non-modular, sine-wave-tracking type with the following features and accessories:
 2. LED indicator lights for power and protection status.
 3. Audible alarm, with silencing switch, to indicate when protection has failed.
 4. One set of Form C dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status.
 5. Surge Protection Device Description: Modular design with field-replaceable modules, sine-wave-tracking type with the following features and accessories:
 6. Fuses, rated at 200-kA interrupting capacity.
 7. Fabrication using bolted compression lugs for internal wiring.
 8. Integral disconnect switch.
 9. Redundant suppression circuits.
 10. Redundant replaceable modules.
 11. Arrangement with copper bus bars and for bolted connections to phase buses, neutral bus, and ground bus.
 12. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
 13. LED indicator lights for power and protection status.
 14. Audible alarm, with silencing switch, to indicate when protection has failed.
 15. One set of Form C dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status. Coordinate with building power monitoring and control system.
 16. Surge-event operations counter.
 17. Peak Single-Impulse Surge Current Rating: 160 kA per phase.
 18. Connection Means: Permanently wired.
 19. Protection modes and UL 1449 SVR for grounded wye circuits with voltages of 480Y/277 and 208Y/120, 3-phase, 4-wire circuits shall be as follows:
 20. Line to Neutral: 800 V for 480Y/277 and 400 V for 208Y/120.
 21. Line to Ground: 800 V for 480Y/277 and 400 V for 208Y/120.
 22. Neutral to Ground: 800 V for 480Y/277 and 400 V for 208Y/120.

C. Applicable Components: Panelboard Suppressors

1. Surge Protection Device Description: Non-modular, sine-wave-tracking type with the following features and accessories:
2. LED indicator lights for power and protection status.
3. Audible alarm, with silencing switch, to indicate when protection has failed.
4. One set of Form C dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status.
5. Surge Protection Device Description: Modular design with field-replaceable modules, sign-wave-tracking type with the following features and accessories:
6. Fuses, rated at 200-kA interrupting capacity.
7. Fabrication using bolted compression lugs for internal wiring.
8. Integral disconnect switch.
9. Redundant suppression circuits.
10. Redundant replaceable modules.
11. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
12. LED indicator lights for power and protection status.
13. Audible alarm, with silencing switch, to indicate when protection has failed.
14. One set of Form C dry contacts rated at 5 A and 250-V, ac, for remote monitoring of protection status. Coordinate with building power monitoring and control system.
15. Surge-event operations counter.
16. Peak Single-Impulse Surge Current Rating: 120 kA per phase.
17. Protection modes and UL 1449 SVR for grounded wye circuits with voltages of 480Y/277 and 208Y/120, 3-phase, 4-wire circuits shall be as follows:
18. Line to Neutral: 800 V for 480Y/277 and 400 V for 208Y/120.
19. Line to Ground: 800 V for 480Y/277 and 400 V for 208Y/120.
20. Neutral to Ground: 800 V for 480Y/277 and 400 V for 208Y/120.
21. Applicable Components - Enclosures
22. NEMA 250, with type matching the enclosure of panel or device being protected.

D60 COMMUNICATIONS

D6010 Data Communications

D6010.10 Data Communications Network Equipment

A. Description:

1. Structured cabling system: The main active Data Communications Equipment will be provided according to the Responsibility Matrix within the appendix. Active equipment for low voltage systems such as the Security video surveillance may be provided within the contract and must be preapproved by the client prior to purchase. Switches will be in the form of a layer 2 managed network switch as a minimum and should be capable of all standard layer 2 functions. The active and passive components of the data communications equipment will be terminated within Low Voltage Distribution Rooms, sufficiently sized to house all required low voltage systems terminations

required for the zone of coverage. The structured cabling system will comprise of both Fiber and copper cables. Low voltage spaces, both inside the building and the parking structure will be linked via Fiber and copper backbone connections. Category rated cables will be run between the faceplate and the termination field on seismically braced trays and terminated on patch panels mounted on seismic racks.

2. **Wireless Network:** The wireless system installed within the parcel will provide certified 802.11a/b/g/n/ac RF coverage throughout the interior and general exterior spaces, such as courtyards and interlinking open areas. Mobility Controllers and passive terminations of the wireless communication system will be terminated within the nearest building Main distribution room. The System shall be implemented with proven state-of-the-art technology that can seamlessly integrate with the rapid evolution of wireless technologies and business applications. The System shall reliably provide wireless service levels throughout the specified coverage area.

B. Functional and Performance Requirements:

1. All rooms pathways and spaces will conform to applicable building codes, TIA-569-D and County Standard 902, where requirements conflict the more stringent shall be followed.
2. All structured cabling will be based in a tiered star formation with the center of the system being at the Main distribution room. A combination of Fiber and Copper cabling will interconnect the Distribution rooms located throughout the building. Rooms should be located within a floor plate so that no horizontal cable of greater than 250 linear feet from the distribution room should be possible.
3. All low voltage termination Rooms shall be fire rated to 1 hour, be sized according to the systems it will be housing (Structured Cabling, AV, Security, paging, Radio etc.). Allowances for required equipment clearances will be included within the room size planned, this includes a minimum clearance of 3 feet both in front and behind all racks and cabinets.
4. Within Low voltage spaces floors shall be anti-static in nature, walls covered with AC grade plywood and lighting to a minimum of 500 Lux. Rooms will not require any ceiling but if a raised floor is installed within the rest of the building this should matched or greater within the Low voltage room. If there is a change in floor height within the room this should be achieved with ramp at the entrance not steps.
5. The Entrance Room and all Distribution rooms will be temperature and humidity controlled 24/7 and power will be backed up by UPS and Generator supply.
6. Each room will be connected to an independent grounding system, with a grounding bus bar presented within the space. All components within the low voltage system shall be ground according to TIA 607-C and all annexes.
7. All equipment and infrastructure will be sized to allow for 25% future expandability.
8. Cabling shall be terminated per T568A wiring scheme and tested to prove compliance to the ANSI/TIA 568 standards.

9. All components of the structured cabling system, not including support infrastructure, will be supplied from a single manufacturer and be standards compliant to match the type of cable being installed.
10. Active switches, unless supplied by the Client, for low voltage systems will have standard Layer 2 functionality and be manageable.
11. Racks and cabinets will be a minimum of 45 RU, and include cable management, both vertical and horizontal, mountable and manageable power supply units and if required shelves to ensure a clean and effective installation. Cabinets will have fan trays included if air flow around the equipment will be an issue.
12. Ladder tray will be installed within distribution spaces to link racks with the levels horizontal pathway. Ladder tray will be mounted at 8'-3" AFF
13. Wall termination cabinets, where needed, will be mounted to AC grade Plywood which will be sized to allow for future expansion.
14. All cable terminations will be presented within the distribution room racks, Patch panels supplied will be certified for the category of cable being terminated. Fiber will be terminated within modular splice enclosures. Allowances for expansion will be included within the amount of available rack space installed.
15. Low voltage spaces will be linked by both Fiber and copper cables to form a backbone. Copper cables will be a minimum of Cat 6 within the backbone, Fiber cables shall be a minimum of OM4 for multimode and OS2 for single mode.
16. Cables will be routed to the preferred pathway via overhead ladder tray within the Distribution room, vertical cable transitions of greater than 2 feet should be done with the support of cable tray fixed vertically to the wall.
17. Horizontal cabling will be a minimum of enhanced Category 6 cable, with AV and WAP's being installed with a minimum of category 6A cable.
18. The Structured cabling system will be covered by an all parts and labor warranty for a period of one year from completion of work and an Advanced Manufacturer System Warranty (lasting 20 years or greater) which will be certified by the cabling manufacturer directly for the client.
19. Nonstandard category cables such as AWG 28 patch cords will not be permitted within the project.

C. Functional and Performance Requirements: Wireless Network

1. All equipment and infrastructure will be sized to allow for 25% growth in the wireless user base.
2. Provide two CAT6A UTP cable to each access point. OSP rated cables and weatherproof containment should be used for all outdoor access points.
3. The system shall IEE 802.11a/b/g/n/ac standards and be surveyed for 802.11ac (5ghz), supporting wireless voice.
4. Access Points will be powered via PoE from network switches or external PoE injectors inside the IDF. Access Points shall be compatible with both 802.3af PoE (limited functionality) and 802.3at PoE+ (unrestricted functionality).
5. Signal strength shall be measured with a predetermined industry standard tool such as Airmagnet calibrated test equipment (or equivalent). Signal strength will be -67dBm or greater for all coverage areas, and signal-to-noise (SNR) ration will be 25 dB or greater.

6. The System shall be designed to minimize co-channel interference, targeting an -85dBm threshold within 90% of the coverage areas for WiFi.
7. Supported frequency bands will include but not be limited to 2.4000 GHz to 2.4835 GHz, 5.150 GHz to 5.250 GHz, 5.250 GHz to 5.350 GHz, 5.470 GHz to 5.725 GHz, 5.725 GHz to 5.850 GHz.
8. The System will consist of a local wireless controller with redundancy.
9. Contractor shall be responsible for coordination with Owner's IT representative for programming of controller functionality.
10. System should support Voice calls over wireless.
11. The system shall not be vulnerable to any cyber security attacks, making it safe to deploy internal and guest users on the same infrastructure.
12. A post-installation site survey shall be done, providing proof of coverage via heat maps and RF survey data.
13. The contractor shall develop and execute an onsite acceptance-testing program. The plan shall address all requirements identified in this specification and test all contractor supplied cabling and hardware components. The plan shall follow accepted industry testing practices and have a method of independent verification described.
14. Any specified item that does not satisfy the requirements of this specification shall be replaced, upgraded, or added by the contractor as necessary to correct the noted deficiencies. After correction of a noted deficiency, re-testing shall be performed to verify the effectiveness of the corrective action.

D. Applicable Components: Structured Cabling system

1. Distribution Rooms will be used to house all active equipment and passive terminations. Rooms will be 1 hour Fire rated.
2. All walls to be covered with Plywood backboard, AC grade, minimum of ¾" thick with 2 coats of fire retardant paint.
3. A grounding bar will be provided, mounted within each Distribution space, isolated for telecommunications use only.
4. Ladder Rack within distribution rooms with 9" rung spacing, sized for a maximum of 40% fill
5. Building entrance protection will be supplied for all external copper connections, whether supplied by the contractor or the service provider.
6. 45RU Racks and Cabinets suitable for mounting modular termination patch panels and sized to allow for 25% expansion. Cabinets shall include front and back doors, end side panels and any accessories required to ensure heat dissipation from active equipment.
7. Two internally mounted PDU will be installed within each rack or cabinet
8. Copper termination patch panels with jacks matching the type of category cable to be installed. A Horizontal cable management unit will be installed for every 48 ports of terminations or active equipment.
9. Fiber cables should be OM4 for multimode and OS2 for single mode or greater, depending on system utilizing cable connection.
10. Multipair copper connections between distribution rooms should be a minimum of Cat 6.

11. Copper category cables will be enhanced category 6 as a minimum with AV and WAP outlets requiring Category 6A. A minimum of two (2) outlets will be presented at each location.
12. Conduit to each internal outlet location shall be a minimum of 1" in size and connect to a back box at least 4 11/16" x 4 11/16" x 2 15/16".
13. Faceplates shall be white or stainless steel and mounted as required either on a wall, within a floor box or within furniture infrastructure.
14. Patch cables will be supplied for each termination. Within the rack or cabinet, they will be white, and sized according to length required between active and passive connection. For each work area connection, a minimum of 10ft patch cable shall be supplied either in white or grey.
15. Site installation information for external device and service connectivity can be found in section G50.

E. Applicable Components: Wireless Network

1. Access points.
2. Category 6A cabling.
3. Mobility controller.
4. Outdoor enclosures (minimum NEMA 4 rated)
5. External antennas to enhance coverage indoor/outdoor rated.
6. Management and monitoring Server/Software.
7. Site installation information for external device and service connectivity can be found in section G50.

D6020 Voice Communications

D6020.20 Voice Communications Terminal Equipment

A. Description: Emergency Telephones

1. Throughout the common areas within the parcel emergency phones shall be installed to enable quick communication at times of distress. Emergency phones will connect back to the reception desk / security office so that those seeking assistance can speak to someone easily. Units shall be wall mounted or free-standing posts with built in cameras and lighting.
2. Within the building emergency phones will be located within areas of refuge, this will be in such a way to avoid accidental activation.

B. Functional and Performance Requirements:

1. ADA compliant mounting unit
2. Dual button unit for both emergency and assistance calls.
3. Integrates with VSS solution for broader view and security coverage, built in camera to provide a minimum of 170 degree viewing angle.
4. Call status light built in
5. Stainless steel faceplate with tamper resistant screws
6. Mobile application support
7. Paging compatible

C. Applicable Components:

1. Two Cat 6 Category cable for connectivity.
2. Unit faceplate with built in functionality
3. Mounting surround for faceplate, either wall mounted or free standing post depending on location.

D6030 Audio-Video Communication

D6030.10 Audio-Video Systems

- A. Description: The Audio-Visual system will be designed to support meetings and training as needed by each department. Rooms and systems will be designed to require little or no outside technical support and user interfaces shall be consistent across all spaces to allow users familiarity with the systems despite room size or complexity. Systems will be engineered to include connectivity with a common backbone to allow maintenance and monitoring of all rooms and system components
- B. Functional and Performance Requirements:
1. Screens will be sized according to ANSI/INFOCOMM standards or the table below whichever is greater.

Room Type	Minimum Screen Size
Small Meeting Rooms	55"
Medium Meeting Rooms	65"
Large Meeting Rooms	75"
XL Meeting Room	75"
Auditorium / XXL Meeting Space	To be sized according to Infocomm / ANSI Standard
Executive Offices	55"
Lobby Area	50" as required by room data sheet
Operations / Command Centers	55" unless noted otherwise
Computer Repair / Lab Testing	42"
Computer Training Room	55"
ITS Innovation / Display Space	55"
Dining Room, Pantries and Custodial Lunch Room	42"
Fitness Center	42"

2. System inputs shall be HDMI, VGA and wireless. Additional input types shall be achieved via adapters to HDMI. HDMI inputs shall be HDMI 2.0 and HDCP 2.2 copy protection.
3. Display resolutions shall be no less than 1080p.
4. Controls for user interfaces will comprise of button panels and touch panels. Button panels will be wall mounted and provide consistent commands for small spaces. Touch panels will be provided in more complex spaces such as meeting rooms with multiple inputs and multiple displays. For Portable systems such as moveable collaboration units, control shall be via manufacturer provided remote.
5. Room schedulers shall be mounted touch panels outside of all rooms with the exception of collaboration spaces which cannot be booked or reserved. Displays will be tied into Microsoft Exchange. System shall allow instant booking via display or from desktop/mobile device via exchange.
6. Audio conferencing capabilities will be provided within each room for smaller rooms this may be provided via a table top conferencing unit and for larger rooms Audio Conferencing will be provided as part of the room audio system via table and/or overhead microphones. In rooms with flexible and movable furniture, provide overhead microphone arrays.
7. Video Conferencing within smaller rooms will be provided by an all in one collaboration appliance that will include video and desktop sharing as well as other collaboration tools. Within larger spaces video conferencing shall be via dedicated VTC codec and utilize in room displays as well as the integrated audio system.
8. Wireless connectivity gateway for BYOD devices include support for computers, tablets, and phones and shall support Windows, Apple, and Android devices. BYOD gateway shall be compatible with County standards if in place at the time of procurement.
9. In rooms with dedicated computers, the computers shall be provided with wireless keyboards and mice, and Blu-ray DVD players.
10. Projection Screens shall be complete with recessed ceiling mounted case, motorized, with low voltage control interface, high contrast grey screen projection surface, and black drop and surround.
11. 11. Projectors in Auditorium shall be mounted to ceiling recessed scissor lift. Lift shall be provided with plenum housing and ceiling closure panel.

C. Applicable Components:

1. Small Meeting Rooms will require Interactive Touch/Pen Display for collaboration, Tabletop input device, Dedicated VTC system, Bring your own device, Voice Activation, Control button panel, Room Scheduler, Table Microphone.
2. Medium Meeting Rooms shall be provided with Presentation Display, with size based on room size, Tabletop input devices, Dedicated VTC system, Bring your own device, Voice Activation, Control touch panel, Room Scheduler, Tabletop Microphone, Sound Reinforcement Speakers, dedicated PC, IPTV.
3. Large Meeting Rooms shall be provided with Presentation Displays, with size based on room size. Additional displays as need for ease of content visibility,

Tabletop input devices, Dedicated VTC system, Bring your own device, Voice Activation, Control touch panel, Room Scheduler, Tabletop Microphone, Sound Reinforcement Speakers, Dedicated PC, IPTV.

4. XL Meeting Rooms shall be provided with Presentation Displays, with size based on room size. Additional displays as need for ease of content visibility, Main image screen sized for total room depth, Tabletop input devices, Dedicated VTC system, Bring your own device, Voice Activation, Control button panel, Room Scheduler, Zoned Tunable Ceiling Microphone, Sound Reinforcement Speakers, Podium, Document Camera, Dedicated PC, Confidence Monitoring, Ceiling Camera, IPTV.
5. Auditorium shall be provided with Main Dual Image Displays sized for total depth and layout. Additional displays as need for ease of content visibility, Dedicated VTC system, Bring your own device, Control button panel, Room Scheduler, Sound Reinforcement Microphone/Speakers, Podium, Document Camera, Confidence Monitoring, Ceiling Camera, Dedicated PC, IPTV.
6. Executive Office, including Bureau Chiefs and higher, shall be provided with a Presentation Display, with size based on room size, Tabletop input device, Dedicated VTC system, Voice, IPTV.
7. Lobby Area will require Flat Panel display, Digital Signage, IPTV. (Refer to room data sheet for overall size of display)
8. Networks Operation Center shall be provided with Multiple Displays for necessary viewing from every seat, Integrated Control System, Sound reinforcement Microphone/Speakers, Full control and routing of all sources to any display or breakout room associated with the Operations center.
9. Enterprise Command Center shall be provided with Multiple Displays for necessary viewing from every seat, Integrated Control System, Sound reinforcement Microphone/Speakers .
10. Departmental Operation Center shall be provided with Multiple Displays for necessary viewing from every seat, Integrated Control System, Sound reinforcement Microphone/Speakers.
11. Training Room shall be provided with Multiple Displays for necessary viewing from every seat, Dedicated VTC system, Control button panel, Room Scheduler, Sound Reinforcement Microphone/Speakers, Podium, Document Camera and Ceiling Cameras.
12. Break and Lunch rooms will require Flat Panel display, IPTV.

D6060 Distributed Communications and Monitoring

D6060.10 Distributed Audio-Video Communications Systems

- A. Description: Overhead paging will be provided for general announcements through the building, this system will be in addition to any solution provided as part of the fire life safety system. This system shall be configured to allow paging within specific zones of the building as well as full building all call announcements.
- B. Functional and Performance Requirements:
 1. Inputs for the paging system shall be via the telephone system, which will require as appropriate interface to all integration and communication between the two.

2. Paging head end equipment will be located within the low voltage distribution rooms with locations to be optimized for distribution end point distances.
3. Paging zones will be provided with ambient noise sensors to allow automatic level control of paging volume within each zone.
4. Paging speakers shall be selected and spaced to allow for plus or minus 6dB coverage between 400 and 4000Hz.
5. System shall allow for multiple simultaneous pages into disparate paging zones. In instances where two pages are attempted into the same zone, the paging system shall allow for pages to be recorded and queued to allow playback once the earlier pages have completed.

C. Applicable Components:

1. Headend Units.
2. Speakers.
3. Cable
4. Interface connection with Telephone system,
5. Noise sensors

D6060.15 Sound Masking Systems

- A. Description: Sound masking shall be provided in areas listed in the Acoustics section to increase speech privacy between workstations, between workstations and enclosed rooms and between active area and open office workstations.
- B. Functional and Performance Requirements:
 1. The shall include a control unit, digital signal processors, noise generators, amplifiers, loudspeakers, wiring, controls and components to generate, amplify, distribute and reproduce sound masking.
 2. The masking sound shall be generated via a random, non-deterministic digital process.
 3. Loudspeakers shall be at least 5-inches in diameter, with a minimum 10 Watt RMS power rating, a minimum frequency response of 100 to 10,000 hertz and sensitivity of 85 dBA at 1Watt/M to ensure delivery of a broadband frequency spectrum.
 4. The sound masking system shall generate masking levels of 48 dBA in open areas and 42 dBA within non-AV enabled enclosed rooms.
 5. The measured A-weighted sound levels shall not deviated from the specified A-weighted sound levels by more than +/- 1 decibel.
 6. Temporal Uniformity: The A-weighted Leq sound level of the masking sound, measured over at least a 1-minute interval, shall not exceed +/- 2 decibels at any measurement location.
 7. Spatial Uniformity: The overall sound level produced should have a spatial uniformity of no more than +/- 1 decibel between any two sound generating units.
 8. Sound Quality: No audible hum or noise, other than masking sound should be detected from this system.

C. Applicable Components:

1. Enclosed and secure headend equipment.
2. Digital signal processors
3. Noise generators
4. Amplifiers
5. Audio equalizers
6. Loudspeakers
7. Cabling/wiring
8. Scheduling software
9. Diagnostic/monitoring software

D6060.50 Distributed Systems

A. Description:

1. A master clock system shall be utilized within the building providing synchronous time throughout the building. The master clock system will be connected to a Network Time Protocol controller unit, located within the Main distribution room, which will sync with an external time source for accuracy.
2. Distributed Antenna System (Public Safety Network (PSN)): The Public Safety Network (PSN) shall be a fully operational Emergency Responder Radio Antenna/ Repeater System. The system shall primarily support the Fire Department Radio System. Provision for supporting other public safety systems, such as the sheriff or police, the CWIRS, cell phone carriers and or any other radio system may be required and should be confirmed during design. Radio signals shall achieve a minimum of 95dBm signal strength within 95% of the areas of the building or structure.

B. Functional and Performance Requirements:

1. Master clock system will support several types of clock from traditional clock face to digital numeric displays.
2. The NTP controller will synchronize periodically via the internet or a satellite connection
3. Count down or count up timers may be distributions on an as required based per department.
4. The master clock system may also be synchronized with other metric requiring systems in order to provide accurate time keeping.

C. Functional and Performance Requirements – Distributed Antenna System (public Safety Network (PSN)):

1. The DAS electronics shall provide outputs for monitoring by the Fire Alarm System, including but not limited to Donor Antenna Malfunction, signal booster Failure, Signal Booster Trouble and Loss of AC power. The connections shall comply with 4.4.7.1 of NFPA 72.
2. The PSN DAS shall comply with IFC 510 (200()) (2012) and NFPA 72 2013 edition.
3. Where the In building – coverage requirements include 700-800 MHz public safety system and commercial wireless in building coverage, the two systems shall operate over a unified Passive Cable and coverage Antenna Infrastructure.

4. The systems shall be approved and fully accepted by the local Fire Department in writing prior to contract closeout.
5. All wiring and fiber optics shall be installed into conduit for protection.
6. All main risers or trunks of the antenna system shall be installed with a 2 hour fire rating, either by the use of 2 hour rated cable or being housed within a 2 hour rated shaft or enclosure.
7. A minimum signal strength of -95dBm shall be provided throughout the coverage area. With a minimum signal strength of -95dBm received by the local Fire Department.
8. DAS system may utilize a radiating cable, fixed antennas or a combination of both.
9. The Donor antenna signal level shall be a minimum of 15 dB above the DAS under all operating conditions.
10. The radio system may need to support frequencies in the 150, 400, 700 and 800 MHz public safety bands.
11. Reject Filters: Notch filter sections shall be incorporated to minimize the impact of channel cellular and SMR degradation of the signal booster performance.
12. The signal booster shall include retune-able or replaceable filters to allow for any mandatory FCC changes within the NPSPAC band.

D. Applicable Components:

1. Clock units, both traditional face type and digital type.
2. NTP controller unit.

E. Applicable Components – Distributed Antenna Systems (Public Safety Network (PSN)):

1. Bi-Directional Amplifiers (BDA),
2. Fiber-Optic Master Unit
3. Pre-manufactured cable/remote units
4. Donor Antennas,
5. Coverage Antennas,
6. Coaxial Cable and Coax Connectors
7. Splitters, Combiners, and Couplers,
8. Dual power supplies
9. NEMA 4 rated enclosures

D6090 Communications Supplementary Components

D6090.10 Supplementary Components

- A. Description: Support systems for low voltage cabling include conduits, backboxes, junction boxes, cable trays, ladder trays and j hooks. The structured cabling system will utilize such solutions to conform to the TIA 569-D standard as a minimum.
- B. Functional and Performance Requirements:
 1. Main cable routes within the buildings will be kept to communal areas, such as corridors, where ever possible. Main cable routes should not be located over personal offices, meeting rooms and inaccessible ceilings unless there are no possible alternatives.

2. All pathways should be sized for a maximum of 30% fill, to allow for future cable installations.
3. Cables routed across enclosed or fixed ceilings shall be run within conduit with access panels every 100 feet. For cables terminated within the fixed ceiling area an access panel shall be located within 2ft of termination. All outlets will be installed with 10 ft of slack for any relocation needs.
4. All containment will be sized based on a maximum of 40% fill ratio according to cable OD size
5. All internal conduits over 2" will be installed with inner duct, this can be either rigid or cloth based solution.
6. Internal conduit will be metallic and rigid, sized for a maximum of 40% fill and no smaller than 1 1/4" in diameter.
7. Telecommunication Back boxes shall be a minimum of at least 4 11/16" x 4 11/16" x 2 15/16".
8. Wire Basket Cable tray will be installed within ceiling areas for overhead distribution. Wire basket cable tray shall be sized depending on weight load and cable distribution requirements to a maximum of 30% fill. Solid bottom tray or conduit can be used as an alternative within open ceiling areas if cabling is to be hidden or protected.
9. Tray systems should be formed using pre-formed fittings for situations such as crossings, intersections, bends and Tee junctions. All accessories for cable transitions tray division and support should be supplied.
10. Cable runway and ladder tray will be installed within Distribution rooms and the entrance room for cable routing. Ladder tray shall be sized depending on weight load and cable distribution requirements to a maximum of 40% fill. Ladder tray shall have a maximum of 9" spacing between rungs.
11. Ladder tray should be mounted a minimum of 6" above each cabinet or rack.
12. Within drop ceilings Wireless access point enclosures shall be provided to assist with ceiling aesthetics and mounting.
13. All Cable tray pathways will be seismically braced and certified by a structural engineer.
14. All external conduit and fixtures can be found in section G50 of this specification.

C. Applicable Components:

1. Conduit
2. 5 square Back boxes
3. Wire Basket Cable tray
4. 9" rung Ladder tray
5. J Hooks
6. Wireless Access Point enclosures
7. All associated fixtures and fittings

D70 ELECTRONIC SAFETY AND SECURITY

D7010 Access Control and Intrusion Detection

D7010.10 Access Control

- A. Description: Provide a complete and operational building card access control system for the all areas of the building.
- B. Functional and Performance Requirements:
 - 1. System shall be compatible with County and department systems and standards.
 - 2. Security access system shall use a single database for access-control and credential-creation functions and be linked to existing County database.
 - 3. Challenge devices and credentials to include multiformat card readers, Biometric readers, keypads, and smartphone based credentials.
 - 4. Card readers shall be multi class readers capable of reading iClass and Prox card technologies.
 - 5. Coordinate with door hardware required to be monitored or controlled by the security access system. The Controllers in this Section shall have electrical characteristics that match the signal and power requirements of door hardware.
 - 6. All exterior doors to be monitored.
 - 7. Provide access controls on all IDF, Stairwells, Server Rooms, Elevators and mission critical spaces, perimeter gates and doors.
 - 8. Alarm triggers shall be linked to VSS system to allow synchronization of alarm and video monitoring.
 - 9. Doors in the path of egress shall be connected to fire alarm system per code requirements.
 - 10. All power circuits supporting the access control system are to be fed from the UPS panels which are in turn tied to the backup generator.
 - 11. Provide duress button at main reception desk. Alarm to be tied back to Sheriff's Dispatch for monitoring.
- C. Applicable Components:
 - 1. System Software and all programming
 - 2. System hardware including central control unit, door controller(s) and all supervision components
 - 3. Card Readers
 - 4. Credentials compatible with County standards
 - 5. Door control equipment including all request to exit motion detector if not integrated into the lockset, door position switches, and power supplies

D7010.50 Intrusion Detection

- A. Description: Intrusion detection perform monitoring and alarm functions will be integrated into the access control system.

B. Functional and Performance Requirements:

1. ISD and Probation departments are to be configured and controlled as separate zones with dedicated controls
2. Supervision: System components shall be continuously monitored for normal, alarm, trouble conditions.
3. The lobby desk shall monitor as a local station with remote to Dispatch and the Sheriff's Communication Center after hours.

C. Applicable Components:

1. Keypad and Display Module: Provide separate keypads/zones for office/storage area and concessions area of building
2. Control module
3. Door and Window Switches
4. PIR Sensors
5. Acoustic-type, Glass Break Sensors
6. Control Unit with communication interface
7. All power circuits supporting the intrusion detection system are to be fed from UPS panels and tied to backup generator.
8. Audible and Visual Alarm Devices

D7030 Electronic Surveillance

D7030.10 Video Surveillance

A. Description: Provide video surveillance system to monitor and record activity approaching and throughout the facility.

B. Functional and Performance Requirements:

1. System shall record all cameras at 30fps with motion and 10fps with no motion detected for 365 days retention time
2. Exterior coverage zones shall include vehicle and pedestrian entrances, building perimeter and building entrances.
3. Interior coverage zones include lobbies, entrances to IT technology spaces such as server rooms and distributor rooms, reception desks. Additional spaces may require coverage and shall be developed during detailed design
4. Cameras shall provide 60 pixels per foot horizontal resolution at their respective areas of interest with a minimum resolution of 1Mp.
5. Cameras shall be OnVIF S,G compliant with WDR color 0.5 lux, B-W0.01 lux, support multiple configurable streams, PoE 1/3' min imager, automatic back focus.
6. Camera housing and mounts shall be vandal proof and selected to meet environmental conditions.
7. All switches and routers must confirm to ISD IT guidelines
8. VSS system shall be linked to access control system to allow synchronized monitoring of alarm conditions.
9. All power circuits supporting the video surveillance system are to be fed from UPS panels and tied to backup generator.

- C. Applicable Components:
 - 1. IP Cameras enclosures and mounts.
 - 2. Network video recording servers or appliances, software and hardware.
 - 3. All networking switches and routers required to support the system
 - 4. Licenses for all components including remote monitoring of system

D7050 Detection and Alarm

D7050.10 Fire Detection and Alarm

- A. Description: The Fire/Life Safety system shall be addressable multiplex and microprocessor based. The Contractor will include all costs associated with the design, local, state and federal authority/jurisdictional interface, submittal and approval process, and the installation/construction and final approval of the system. The Contractor will be responsible for obtaining all approval of the Fire/Life Safety System from all required authorities. Final concepts shall be approved by County of Los Angeles Fire Department.
- B. Functional and Performance Requirements:
 - 1. New Single Fire/Life Safety system for the entire building
 - 2. County approved / preferred manufacturers are: Honeywell, Simplex and Edwards
- C. Applicable Components:
 - 1. Remote annunciator panel located at primary entrance.
 - 2. Network video recording servers or appliances, software and hardware.
 - 3. All networking switches and routers required to support the system
 - 4. Licenses for all components including remote monitoring of system

D7050.60 Water Intrusion Detection and Alarm

- A. Description: System to monitor possible water egress into critical high-risk locations such as the Telecommunication spaces. In larger spaces, the system shall take a zonal approach and designed according to possible leak situations, i.e. under floor, within equipment drip trays etc.
- B. Functional and Performance Requirements:
 - 1. LCD display with keypad controller to be used for programming, viewing and lockout features
 - 2. Connectivity to VSS, BMS, and UPS required for integration within building management solution.
 - 3. Shall be capable of Spot and level detection.
 - 4. Shall be capable of acting as an Early warning system. With multiple levels of alarm possible
 - 5. Solution shall be fixed in place to prevent damage and migration.
 - 6. Shall be capable of redundancy by connecting to other local zones.
 - 7. Extended system warranty.

- C. Applicable Components:
 - 1. Microprocessor
 - 2. Cable for cross solution connectivity
 - 3. Leak detection tape.

D80 INTEGRATED AUTOMATION

D8010 Integrated Automation Facility Controls

D8010.50 Integrated Automation Control of HVAC Systems

- A. Description: Provide complete Building Management System, including all control and monitoring devices required to provide a complete system.
- B. Functional and Performance Requirements:
 - 1. Manufacturers: Subject to compliance with Performance Requirements, provide one of the following:
 - i. Johnson Controls
 - ii. Allerton
 - iii. Approved Equal

D8010.60 Integrated Automation Control of Electrical Systems

- A. Description: Lighting system control shall be an intelligent network base and shall incorporate various systems components for indoor and outdoor lighting system such as sensors, daylighting, and diming system. Lighting systems shall be on a dedicated panel board/source of power. However, when loads are combined in a board, the loads shall be segregated and monitored by meters. Furthermore, each of the buildings main service shall be equipped with sub-metering to capture various elements of a power system such as volts, Amps, KW, KVA, and KWH and shall be capable of monitoring from remote locations.
- B. Functional and Performance Requirements:
 - 1. LCD display shall be used for viewing and programing.
 - 2. Manufacturers: Subject to compliance with Performance Requirements, provide one of the following:
 - i. Johnson Controls
 - ii. Allerton
 - iii. Approved Equal
- C. Applicable Components:
 - 1. Network connectivity, open protocol for communication.

END OF ELEMENT D

ELEMENT E – EQUIPMENT AND FURNISHINGS

E10 EQUIPMENT

E1010 Vehicle and Pedestrian Equipment

E1010.50 Loading Dock Equipment

- A. Description: Dock bumpers, dock levelers, and related loading dock equipment and accessories.
- B. Functional and Performance Requirements:
 - 1. Dock-Leveler Standard: Comply with MH 30.1, "Safety, Performance, and Testing of Dock Leveling Devices."
 - 2. Dock Leveler Vertical Travel: Minimum working range of 12 inches above and 12 inches below adjoining platform level and with an operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact.
 - 3. Automatic Vertical Compensation: Floating travel of dock leveler ramp with lip extended and resting on truck bed compensates automatically for upward or downward movement of truck bed during loading and unloading.
 - 4. Automatic Lateral Compensation: Tilting of dock leveler ramp with lip extended and resting on truck bed compensates automatically for canted truck beds of up to 4 inches over width of ramp.
 - 5. Lip Operation: Manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.
 - 6. Automatic Ramp Return: Of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs.
- C. Applicable Components:
 - 1. Dock Bumpers: Laminated tread or molded rubber type; units integral with dock levelers are acceptable.
 - 2. Dock Levelers: Recessed, hinged-lip-type designed for permanent installation in concrete pits, preformed in the edge of loading platform. Hydraulic operation, minimum 45,000 lb. rated capacity.
 - 3. Dock Leveler Safety Devices: Toe guards, cross traffic support, free-fall protection.

E1030 Commercial Equipment

E1030.40 Maintenance Equipment

- A. Description: Façade access system for routine facade maintenance, window cleaning, and rooftop work within 6-feet of roof edge.
- B. Functional and Performance Requirements:
 - 1. Occupational Safety and Health Administration (OSHA), OSHA 1910, Subpart D, Walking and Work Surfaces.
 - 2. OSHA 1910, Subpart F, Appendix C, Personal Fall Arrest Systems.
 - 3. OSHA 1910.66 Subpart F, Powered Platforms.
 - 4. ANSI/IWCA I-14.1, Window Cleaning Safety Standard.
 - 5. Ensure davits requiring 80 lbs or greater lifting effort are equipped with mechanical means of hoisting into position.
 - 6. Supports for Suspended Platforms: permanently installed support equipment and the structure to which they are attached to be designed for 1,000 lb. minimum static working load.
 - 7. Fall Arrest Safety Anchors: designed to resist a 5,000 lb. load in any direction without detachment or fracture occurring. To avoid deformation under normal usage, anchors are to be generally designed to resist a 1,000 lb. static working load in any direction.
 - 8. Insurance: Façade Access system manufacturer to carry specific liability insurance (products and completed operations) in the amount of \$2,000,000.00 to protect against product/system failure.
- C. Applicable Components:
 - 1. Tiebacks.
 - 2. Horizontal Life Line (HLL) system at areas where top of parapet is less than 42-inches above roof surface.
 - 3. Davit supports.
 - 4. Davits and stages.

E1030.80 Foodservice Equipment

- A. Description: Manufactured and custom commercial foodservice equipment for BOH Kitchen and Servery.
- B. Functional and Performance Requirements:
 - 1. The equipment and its component parts shall be new and unused. All items of standard manufactured equipment shall be current models at the time of delivery. Parts subject to wear, breakage, or distortion shall be accessible for adjustment, replacement and repair.
 - 2. The cutting of holes in equipment for pipe, drains, electrical outlets, etc., required for the project shall be included in the work. Work shall conform to the highest standards of workman-ship and shall include welded sleeves, collars, ferrules, escutcheons and flashing.
 - 3. All commercial foodservice equipment to be classified as Heavy Duty construction.

4. NSF Standards: Comply with applicable NSF International (NSF) standards and criteria and provide NSF, UL Sanitation and/or ETL Sanitation Certification Mark on each equipment item, unless otherwise indicated.
5. All equipment, work, and materials must comply with Federal, State and Local laws, ordinances, and regulations and is confirmed by the local inspector having jurisdiction. (US Public Health, Local Health, OSHA, etc...)
6. AGA: Provide gas burning appliances certified by the American Gas Association (AGA)
7. ASHRAE Compliance: Provide mechanical refrigeration systems complying with the American Society of Heating, Refrigerating and Air-Conditioning Engineers' ASHRAE 15, "Safety Code of Mechanical Refrigeration."
8. ANSI Standards: Comply with applicable ANSI standards for electric-powered and gas-burning appliances; for piping and compressed-gas cylinders; and for plumbing fittings, including vacuum breakers and air gaps, to prevent siphonage in water piping.
9. Refrigeration Compressor Warranty: 5 years from date of acceptance by owner.
10. Fabricate Millwork/Casework foodservice equipment according to the "Manual of Millwork, current edition" of the Woodwork Institute, including all emended printed revisions, and NSF Standards. Factory assemble equipment to the greatest extent possible.
11. Signed by manufactures of refrigeration systems, refrigerated equipment or their authorized agents certifying that systems furnished comply with NSF 7 requirements and will maintain operating temperatures indicated in the areas or equipment that they will serve.
12. Stainless Steel: Finish for exposed surfaces to be #4 polished, protective covering shall be provided on all polished surfaces and retained and maintained until time of final testing, cleaning, start-up and substantial completion. Stainless steel Sheet, Strip, Plate, and Flat Bar to be ASTM A 666, Type 304, stretcher leveled.
13. Stainless Steel Equipment: for all parts of custom tables, tops, benches, sinks, cabinets, etc., shall be AICI type 304 (18-8 Austenitic). All gauges called for shall be U.S. Standard Gauges.
14. Stainless Steel Tables: fabricate with reinforced tops, legs, and reinforced undershelves or cross bracing. Tops to be minimum 14 gauge, legs to be 1-5/8 inch OD, minimum 16 gauge thick stainless steel with stainless steel gusset and adjustable insert bullet type feet with minimum adjustment of 1 inch up or down without exposing threads. Undershelves to be minimum 16 gauge thick stainless steel. Top and undershelf reinforcement to be minimum 14 gauge thick stainless. Cross bracing to be minimum 16 gauge thick stainless steel.
15. Sinks: Fabricate of minimum 14 gauge thick stainless steel with fully welded, 1-piece construction. Construct 2 sides and bottom of sink compartment from 1 stainless steel sheet with ends welded integral and without overlapping joints or open spaces between compartments. Provide double wall partitions between compartments with ½ inch radius rounded tops that are welded integral with sink body. Cove horizontal, vertical, and interior corners with ¾ inch radius. Pitch and crease sinks to waste for drainage without pooling. Seat wastes in die stamped depressions without solder, rivets, or welding.

16. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Provide ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.
17. Exhaust Hood Fabrication: Provide listed hoods with dual wall construction and manufactured from minimum 18 gauge thick type 304 stainless steel. Exhaust hood performance test shall be in accordance with ASTM F1704-05. Manufacture shall submit validation that full capture and containment of appliance thermal plume and smoke can be accomplished at specified/design air volumes without modifications to duct size, filter velocity or hood/system static pressure. Provide removable stainless steel baffle type grease, minimum 18 gauge stainless steel filter frame and removable collection basins or troughs. Hood to be provided with wet chemical fire suppression system, model R102 as manufactured by "Ansul", or equal compliance with UL300 standards.
18. Walk-in Coolers/Freezers: Panels shall be pre-fabricated, sectional construction minimum 5 inch thick, of tongue and groove design with foamed in place gaskets on the ale side of all interior and exterior panels and rigid urethane frame. Gaskets shall be impervious to stains, greases, oils, and mildew and be resistant to chemical corrosion and ultraviolet radiation. Panels shall be completely filled with rigid 100% foamed in place non CFC urethane between interior and exterior metal skins which have been die formed and gauged for uniformity in size. Rigid polyurethane blowing agents shall comply with current US EPA SNAP program listings. Slab urethane or polystyrene are not acceptable. In addition, wood shall not be acceptable in any panel including doors, walls, floor, and ceiling. Insulated floor depressions shall provide Styrofoam insulation for cooler and freezer floors, insulation shall be a minimum of 2 layers 60 high load extruded polystyrene, 2 inch thick with R-value 75°F mean temperature.
19. Remote Refrigeration Systems: Mechanical refrigeration systems, including compressor units, condensers, refrigerant piping, evaporator coils, control valves, compressor racks, weather covers and required miscellaneous items. Refrigeration equipment shall consist of two major assemblies. One is the condensing unit assembly with all necessary components, factory installed and wired including single point electrical control panel, circuit breakers and contactors, OSHA approved fan guards, aluminum flexible conduit for internal wiring, suction filter, sight glass, drier, adjustable dual pressure control, flexible pressure hoses, ROTolock compressor adaptors and necessary tubing. The other is the refrigeration coil assembly/heat exchanger with expansion valve, electronic thermostat temperature control with electronic defrost time clock and on/off power switch, complete factory mounted and factory pressure tested with dry nitrogen. Refrigeration lines insulation shall have a minimum ½" Armstrong Armaflex AP Pipe insulation sealed with adhesive foam insulation. For glycol systems the minimum insulation shall be ¾". Tape fittings to be sufficient thickness to prevent condensation. Lines ran externally shall include a hard white PVC Cover.
20. Install all foodservice equipment level and plumb, according to manufacturer's written instructions, original design, and referenced standards.
21. Install hoods to comply with NFPA 96 requirements and to remain free from vibration when operating.

22. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure food service equipment is without damage or deterioration at the time of Substantial Completion.

C. Applicable Components:

1. Dry Storage Shelving – Adjustable wire shelving, shelves and posts to be constructed of heavy-gauge carbon steel or type 304 stainless steel.
2. Slicer – Heavy Duty, 13" blade, 8-safety interlocks, seamless anodized aluminum construction, high carriage 25° incline towards operator, 40° gravity feed, removable pusher-plate, and ½ HP.
3. Food Processor – Cutter/Mixer, 7 liter stainless steel bowl with handle and see thru lid, "S" blade with smooth edges, on/off switch, two speeds 850 & 1750 RPM, 3 HP.
4. Scrap Collector – Scrapping, pre-flushing and collecting system, control panel with operator sensor, two water saving modes (timed run & auto start/stop), salvage basin and silverware trap, scrap basket, ¾ HP corrosion resistant pump, pump intake screen, stainless steel construction.
5. Faucets/Pre-Rinse – Stainless steel construction, lever handles, hot and cold index buttons, swiveling seat disks, stainless steel seats, stainless steel seat screws, stainless steel handle screws.
6. Mixer – Fixed speeds plus stir speed, geared transmission, Shift-on-the-Fly controls, 15 minute smart timer, ergonomic swing out bowl with quick release agitators, stainless steel bowl guard.
7. Reach-In Refrigerator – Stainless steel exterior and interior, top mounted compressor, chrome plated wire shelves per section, expansion valve, high/low service valves, sight glass, low pressure burnout protection, digital temp controls, interior LED lighting.
8. Transport Racks and Carts – Heavy Duty, high strength, extruded aluminum, double riveted aircraft construction throughout, ball bearing swivel casters with self-lubricating axle and 14 gauge channel bottom frame.
9. Double Stack Convection Oven – Double-deck, bakery depth, thermostatic controls, single speed fan, vertical opening doors with windows, stainless steel top front and sides, 3" high flue deflector with stainless steel front trim, gas manifold for single point connection.
10. Double Stack Steamer – Convection steamer, pressureless, gas, 2 compartments with individual generators, Surecook controls, 60 minute mechanical timer and manual bypass switch, 1 standard treated and tap water connection, stainless steel construction.
11. Combination Oven – Boilerless gas combi oven steamer, steam on demand and various steam, 4 speed fan, core temperature probe, glass door, dual stage door latch, 13 position rack glides, 5 wire shelves, retractable hose reel, stainless steel construction.
12. Open Burner Range – Heavy Duty Range, 30,000 BTU open burners, countertop, stainless steel front and 4" flue riser, unitized construction if part of range line (guard rail, front panels, capping strips per seam)
13. Griddle w/ Oven Base – Heavy Duty Range, 1" thick griddle plate, thermostatic controls, standard oven base, stainless steel front and 4" flue riser, unitized

construction if part of range line (guard rail, front panels, capping strips per seam).

14. 6 Gal Steam Jacket Kettle w/ Stand – Electric countertop, twin 6 gallon capacity, tilt type, center support console, two-thirds steam jacket, stainless steel construction, equipment stand open base with sliding drain drawer and splash screen, stainless steel top and legs.
15. Tilt Skillet – bead blasted cooking surface, 10° tilt cooking feature, with easy manual hand tilt, spring assisted cover with vent, gallon and liter markings, food strainer, stainless steel construction with open leg frame.
16. Wall Mounted Handsink – Wall mounted 14" wide x 10" front to back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, lever drain with overflow, P-trap, soap and towel dispenser, wall bracket.
17. Single Rack High Temp Dishmachine w/ Booster – door type, high temperature with built-in booster, approximately 53 racks/hour capacity, 1.13 gallon/rack, front mounted controller with digital display and service diagnostics, 3 variable programmed time/pressure cycles, fully automatic operation, automatic push-handle cycle start, auto safe temperature control for guaranteed sanitization, soft start fine chine and glassware protection system, corner or straight-thru, double wall stainless steel construction, pumped drain and rinse, 2 HP wash pump.
18. Pre-Rinse Faucet – single deck dual control valve, with spring action flexible gooseneck, 21" riser, 36" hose, wall bracket, spray valve 1.15 gallons per minute at 60 PSI, stainless steel construction
19. Service Counters – Construct using 11 gauge, type 304 stainless steel end panels, 14 gauge galvanized horizontal supports fastened mechanically providing integral utility chase and 18 gauge, type 304 stainless steel removable bottom shelf and adjustable intermediate shelf where possible. Counter to be set on galvanized curb base, integral utility chase with removable interior back panels for easy access to conceal seal tight conduit and wiring.
20. Refrigerated Grab n Go Merchandiser – Specialty display high profile refrigerated merchandiser, energy saving night curtain, top light, (4) tiers of adjustable black metal shelves, stainless steel display deck, black interior, tempered glass ends, choice of laminate, condensate evaporator provided.
21. Split Vat Fryer w/ Filter – High Efficiency fryer, (2) 20-25lb oil capacity tanks, solid state controls, boil out and melt cycle, drain valve interlock, matchless ignition, self-clean burners, downdraft protection, stainless steel tank, front and sides, total 100,000 BTU, under fryer drawer filtration.
22. Sandwich Prep Table – stainless steel top with polyethylene cutting board, abs interior sides, stainless steel front and sides, front breathing rear mounted refrigeration system.
23. Charbroiler – heavy duty range match countertop, self-cleaning stainless steel radiants, 2-position cast iron ultra-flow reversible top grate, stainless steel front and top trim, 76,000 BTU.
24. Hoot Food Warmer – top mount, built-in, electric, 12"x20" opening, wet/dry operation, infinite controls, stainless steel interior, insulated aluminized steel housing.

25. Refrigerated Equipment Stand – heavy duty refrigerated equipment base/stand with drawers, side mounted self-contained refrigeration, welded stainless steel body, frame, front, sides and top, 6" adjustable stainless steel legs, ½ HP.
26. Undercounter Freezer – Compact undercounter freezer, reach-in, stainless steel exterior and interior, rear mounted self-contained refrigeration, (4) 2-3/4" casters.
27. Toaster – Conveyor toaster, horizontal conveyor, countertop design, all bread types' toaster, approximately 14 slice capacity/min, 2" opening height, electronic controls, colorguard sensing system.
28. Rapid Cook Oven – Convection/Microwave Oven, rapid cook, electric, ventless, countertop, insulated cook chamber, LED Timer, pull down door with ergonomic handle, multi-speed convection blower, removable rack and bottom jetplate, smart voltage sensor, stainless steel interior, powder coated corrosion resistant steel outer wrap and door.
29. Panini Press – multi contract grill, grooved top and bottom plate, adjustable thermostat, head distribution, easy clean system.
30. Soup Well – top mount, built-in electric for 11 quart round inserts, drain, wet/dry operation, thermostatic control, non-insulated, stainless steel interior.
31. Refrigerated Cold Pan – drop-in mechanically cooled pan, 8" deep, 1" dia drain, insulated pan, stainless steel inner liner and top, galvanized steel outer liner, includes adapter bars, self-contained refrigeration.
32. Ice Cream Freezer – Countertop drop-in display freezer.
33. Hybrid Merchandising Display – specialty display hybrid merchandiser refrigerated self-serve bottom with non-refrigerated service top, bottom: black laminated exterior with black trim, horizontal top and front light, 2 tiers of black metal shelves with black interior, tempered glass ends. Top: glass with black trim, top light with lightened shelves, 2 tier black wire shelves, sliding rear doors.

E1040 Exterior Athletic Equipment (Basis of Design is Greenfields Outdoor Fitness)

E1040.01 2-Person Incline Sit-Up Bench

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 3. The joints' welding is at least 2/5-1/2 inch thick.
 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.

7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.

C. Applicable Components

1. Pre-Galvanized tubes
2. Cold Galvanize after fabrication
3. Orange Peel DuPont Powder Coating with UV protection
4. Installation Method -no obstacles or trip-hazards
5. Modular LDPE boards offer low heat conductivity
6. LDPE Sit-Up board overall size is 17.5"wide x 43" long (1.75" thick) offers great support for users of all sizes
7. Detailed User Instructions, including a QR Code featuring "How To" video
8. 10 Years Limited Warranty
9. Local service center with average of 12-24 hrs response time

E1040.02 4-Person Lower Body Combo

- A. Description: Exercises inner thigh abductor, hamstring, hip-flexor, knee/leg raises, twisting station, dip station. Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.

B. Functional and Performance Requirements:

1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
2. All equipment is constructed of SAE 1020 High Carbon Steel.
3. The joints' welding is at least 2/5-1/2 inch thick.
4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.

C. Applicable Components

1. Pre-Galvanized tubes
2. Cold Galvanize after fabrication
3. Orange Peel DuPont Powder Coating with UV protection
4. Installation Method - offer no obstacles or trip-hazard
5. Built-in SafeStop range limited inside pendulum arm to protect user and equipment. Stop motion at 60 degrees.

6. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
7. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)
8. Two Kick-Steps to allow easier user position of the leg/knee raises station (Abs)
9. HDPE backrest offer low heat conductivity.
10. LDPE arm rest offer low heat conductivity
11. Detailed User Instructions, including a QR Code featuring "How To" video
12. 10 Years Limited Warranty
13. Local service center with average of 12-24 hrs response time

E1040.03 4-Person Pendulum, Abs & Dips Station

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 3. The joints' welding is at least 2/5-1/2 inch thick.
 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 1. Pre-Galvanized tubes
 2. Cold Galvanize after fabrication
 3. Orange Peel DuPont Powder Coating with UV protection
 4. Installation Method - offer no obstacles or trip-hazard
 5. Built-in SafeStop range limited inside pendulum arm to protect user and equipment. Stop motion at 60 degrees.
 6. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 7. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)

8. Two Kick-Steps to allow easier user position of the leg/knee raises station (Abs)
9. HDPE backrest offer low heat conductivity.
10. LDPE arm rest offer low heat conductivity
11. Detailed User Instructions, including a QR Code featuring "How To" video
12. 10 Years Limited Warranty
13. Local service center with average of 12-24 hrs response time

E1040.04 2-Person Cross Country Ski

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 3. The joints' welding is at least 2/5-1/2 inch thick.
 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 1. Pre-Galvanized tubes
 2. Cold Galvanize after fabrication
 3. Orange Peel DuPont Powder Coating with UV protection
 4. Installation Method - offer no obstacles or trip-hazard
 5. Built-in SafeStop range limited inside pendulum arm to protect user and equipment. Stop motion at 50 degrees
 6. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 7. Hand Grips use 3" diameter to prevent protrusion
 8. HDPE Side Panels provide additional protection while unit is in use
 9. LLPD Footrest offer low heat conductivity
 10. Detailed User Instructions, including a QR Code featuring "How To" video on a standalone sign
 11. 10 Years Limited Warranty
 12. Local service center with average of 12-24 hrs response time

E1040.05 2-Person Back & Arms Combo

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.
 - 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 - 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 - 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 - 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 - 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 - 1. Pre-Galvanized tubes
 - 2. Cold Galvanize after fabrication
 - 3. Orange Peel DuPont Powder Coating with UV protection
 - 4. Installation Method - offer no obstacles or trip-hazard
 - 5. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 - 6. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)
 - 7. Ergonomic LDPE Backrest offer low heat conductivity, while providing better support
 - 8. LDPE Seat offer low heat conductivity
 - 9. Under the seat footrest for optimal leverage and preventing injury.
 - 10. Detailed User Instructions, including a QR Code featuring "How To" video.
 - 11. Separate Age Appropriate Sign mounted on the main post
 - 12. 10 Years Limited Warranty
 - 13. Local service center with average of 12-24 hrs response time

E1040.06 2-Person Wheelchair Accessible Vertical Press

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.
 - 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 - 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 - 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 - 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 - 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 - 1. Pre-Galvanized tubes
 - 2. Cold Galvanize after fabrication
 - 3. Orange Peel DuPont Powder Coating with UV protection
 - 4. Installation Method - offer no obstacles or trip-hazard
 - 5. Accessible Side supports a counter weight of 138 lbs.
 - 6. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 - 7. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)
 - 8. Ergonomic LDPE Backrest offer low heat conductivity, while providing better support
 - 9. LDPE Seat offer low heat conductivity
 - 10. Under the seat footrest for optimal leverage and preventing injury.
 - 11. Detailed User Instructions, including a QR Code featuring "How To" video.
 - 12. Separate Age Appropriate Sign mounted on the main post
 - 13. Universal ADA Sign mounted on the main post
 - 14. 10 Years Limited Warranty
 - 15. Local service center with average of 12-24 hrs response time

E1040.07 2-Person Wheelchair Accessible Lat Pull Down

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.
 - 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 - 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 - 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 - 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 - 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 - 1. Pre-Galvanized tubes
 - 2. Cold Galvanize after fabrication
 - 3. Orange Peel DuPont Powder Coating with UV protection
 - 4. Installation Method - offer no obstacles or trip-hazard
 - 5. Accessible Side supports a counter weight of 138 lbs.
 - 6. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 - 7. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)
 - 8. Ergonomic LDPE Backrest offer low heat conductivity, while providing better support
 - 9. LDPE Seat offer low heat conductivity
 - 10. Under the seat footrest for optimal leverage and preventing injury.
 - 11. Detailed User Instructions, including a QR Code featuring "How To" video
 - 12. Separate Age Appropriate Sign mounted on the main post
 - 13. Universal ADA Sign mounted on the main post
 - 14. 10 Years Limited Warranty
 - 15. Local service center with average of 12-24 hrs response time

E1040.08 2-Person Wheelchair Accessible Chest Press

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.
 - 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 - 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 - 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 - 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 - 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 - 1. Pre-Galvanized tubes
 - 2. Cold Galvanize after fabrication
 - 3. Orange Peel DuPont Powder Coating with UV protection
 - 4. Installation Method - offer no obstacles or trip-hazard
 - 5. Accessible Side supports a counter weight of 138 lbs.
 - 6. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 - 7. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)
 - 8. Ergonomic LDPE Backrest offer low heat conductivity, while providing better support
 - 9. LDPE Seat offer low heat conductivity
 - 10. Under the seat footrest for optimal leverage and preventing injury.
 - 11. Detailed User Instructions, including a QR Code featuring "How To" video
 - 12. Separate Age Appropriate Sign mounted on the main post
 - 13. Universal ADA Sign mounted on the main post
 - 14. 10 Years Limited Warranty
 - 15. Local service center with average of 12-24 hrs response time

E1040.09 Single Rower

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.
 - 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 - 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 - 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 - 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 - 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 - 1. Pre-Galvanized tubes
 - 2. Cold Galvanize after fabrication
 - 3. Orange Peel DuPont Powder Coating with UV protection
 - 4. Installation Method - offer no obstacles or trip-hazard
 - 5. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 - 6. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)
 - 7. Ergonomic LDPE seat offer low heat conductivity, while providing better support
 - 8. Detailed User Instructions, including a QR Code featuring "How To" video on a stan alone sign
 - 9. 10 Years Limited Warranty
 - 10. Local service center with average of 12-24 hrs response time

E1040.10 Single Leg Extension

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.
 - 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 - 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 - 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 - 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 - 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 - 1. Pre-Galvanized tubes
 - 2. Cold Galvanize after fabrication
 - 3. Orange Peel DuPont Powder Coating with UV protection
 - 4. Installation Method - offer no obstacles or trip-hazard
 - 5. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 - 6. Built-in SafeStop range limited inside pendulum arm to protect user and equipment. Stop motion at 90 degrees
 - 7. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)
 - 8. Ergonomic LDPE seat offer low heat conductivity, while providing better support
 - 9. Single Weight uses 30 lbs single pivoted weight
 - 10. Detailed User Instructions, including a QR Code featuring "How To" video
 - 11. 10 Years Limited Warranty
 - 12. Local service center with average of 12-24 hrs response time

E1040.11 4-Person Leg Press

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.
 - 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 - 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 - 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 - 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 - 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 - 1. Pre-Galvanized tubes
 - 2. Cold Galvanize after fabrication
 - 3. Orange Peel DuPont Powder Coating with UV protection
 - 4. Installation Method - offer no obstacles or trip-hazard
 - 5. 2RS Sealed ball-bearings are used (not bushings) - with life cycle of 10,000 hours (Those bearings are with rubber seal on both sides. RS provides a better seal but more rolling friction than 2Z bearings)
 - 6. Built-in SafeStop range limited inside pendulum arm to protect user and equipment. Stop motion at 22.5 degrees
 - 7. Ergonomic LDPE Backrest offer low heat conductivity, while providing better support
 - 8. LDPE Seat offer low heat conductivity
 - 9. Detailed User Instructions, including a QR Code featuring "How To" video
 - 10. Separate Age Appropriate Sign mounted on the main post
 - 11. 10 Years Limited Warranty
 - 12. Local service center with average of 12-24 hrs response time

E1040.12 4-Person Combo Bars

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.
 - 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 - 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 - 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 - 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
 - 8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.
- C. Applicable Components
 - 1. Pre-Galvanized tubes
 - 2. Cold Galvanize after fabrication
 - 3. Orange Peel DuPont Powder Coating with UV protection
 - 4. Installation Method - offer no obstacles or trip-hazard
 - 5. Ergonomic LDPE Armrest offer low heat conductivity, while providing better support
 - 6. HDPE Backrest offer low heat conductivity
 - 7. Detailed User Instructions, including a QR Code featuring "How To" video mounted on the main post
 - 8. Separate Age Appropriate Sign mounted on the main post
 - 9. 10 Years Limited Warranty
 - 10. Local service center with average of 12-24 hrs response time

E1040.13 Plyometric Steps (Set of 3)

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 - 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 - 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 - 3. The joints' welding is at least 2/5-1/2 inch thick.

4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.

C. Applicable Components

1. Three (3) Steps at 6", 12" & 18" heights
2. Each step is constructed for superior durability and uses
 - A. 1/4" Steel Sheet
 - B. 3" O.D. Steel Tube
 - C. 1/8" Thick Gussets
 - D. 1" O.D. Tube
3. Step Up platform is made of 24"x13"x 0.75" Marine Anti-Slip HDPE with low heat conductivity
4. Hot-Dipped Galvanize after fabrication
5. Powder Coating
6. Installation Method - offer no obstacles or trip-hazard
7. Detailed User Instructions, including a QR Code featuring "How To" video on a standalone sign
8. 10 Years Limited Warranty
9. Local service center with average of 12-24 hrs response time

E1040.14 Back Extension

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.
- B. Functional and Performance Requirements:
 1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
 2. All equipment is constructed of SAE 1020 High Carbon Steel.
 3. The joints' welding is at least 2/5-1/2 inch thick.
 4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
 5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
 6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
 7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.

8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.

C. Applicable Components

1. Hot-Dipped Galvanize after fabrication
2. Powder Coating
3. Installation Method - offer no obstacles or trip-hazard
4. HDPE Board offer low heat conductivity
5. Hand Grips use 3" diameter to prevent protrusion (3" large diameter, 6 inch-long, grip is 1.75" thick)
6. Detailed User Instructions, including a QR Code featuring "How To" video on a standalone sign
7. 10 Years Limited Warranty
8. Local service center with average of 12-24 hrs response time

E1040.15 Kickboxing Station

- A. Description: Powder coated steel outdoor exercise equipment installed using a surface mount, with posts bolted to concrete.

B. Functional and Performance Requirements:

1. All fitness zones to meet standards set out in Section 5.5 - Fitness Zones of 'Park Design Guidelines and Standards' issued by the County of Los Angeles Department of Parks and Recreation
2. All equipment is constructed of SAE 1020 High Carbon Steel.
3. The joints' welding is at least 2/5-1/2 inch thick.
4. The bearings are made of cast steel with cast steel rollers, and do not require re-lubrication.
5. All seats and stepping platforms are made of custom molded LLDPE and HDPE Plastic.
6. After fabrication and welding, all parts are hot dip galvanized for rust protection.
7. All metal parts receive two layers (120-400 microns) of DuPont Powder Coat.
8. An additional layer of polyurethane UV3 (450 microns) is applied to all metal parts for ultraviolet protection.

C. Applicable Components

1. Post is Hot-Dipped Galvanize after fabrication
2. Powder Coating
3. Installation Method - offer no obstacles or trip-hazard
4. Four (4) Pads are made of 2" thick molded PU with UV protection, around a LLDPE core sleeve
5. Each pad is 14.5" high and 14.5" in Diameter (37cm x 37cm)
6. Pads are secured at the top with vandal resistant stainless-steel hardware
7. Offering a combined 59" of target practice area (150cm) and total height of the unit is 71" (180 cm)
8. Local service center with average of 12-24 hrs response time

E1060 Residential Appliances

- A. Description: Energy Star compliant, new appliances
- B. Functional and Performance Requirements – Refer to additional information in room data sheets.
 - 1. Offer manufacturer’s extended warranty (minimum of 3 years) for parts and services.
- C. Applicable Components:
 - 1. Refrigerator (Standard) 36-inch wide, 22 cubic feet minimum capacity, countertop depth. French door or single door refrigerator.
 - 2. Refrigerator (Compact): 24-inch wide, 5.7 cubic feet capacity undercounter refrigerator.
 - 3. Microwave Oven: Under-cabinet or drawer type, 1.6 cubic foot minimum capacity, 950 watts cooking power.

E20 FURNISHINGS

E2010 Fixed Furnishings

E2010.20 Window Treatments

- A. Description: Window treatments for solar shading, privacy and audiovisual.
- B. Functional and Performance Requirements:
 - 1. Fire Performance Requirements: Per California Building Code requirements for interior finishes, based upon Occupancy classification and construction Type per Code.
 - 2. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 3. Shadecloth minimum thickness of 30 mils, non-raveling vinyl, polyester yarn. Shadecloth containing fiberglass is not acceptable.
 - 4. Provide 25 year warranty on roller shade hardware, chain and shadecloth
 - 5. Mechoshade or approved equal
- C. Applicable Components:
 - 1. Roller shades, manually or power operated.
 - 2. Power operated, motorized blackout shades at AV enabled conference rooms.

E2010.30 Casework

- A. Description: Built-in casework and counters.
- B. Functional and Performance Requirements:
 - 1. WI Custom Grade.
 - 2. Hardware: ANSI/BHMA A156.1, Grade 1.

- C. Applicable Components:
 - 1. Solid surfacing countertops, 3/4 inch minimum thickness.
 - 2. Quartz agglomerate countertops, 3/4 inch minimum thickness.

E2050 Movable Furnishings

E2050.30 Furniture

- A. Description: Commercial furniture, as described in Room Data Sheets/FF&E Narrative, Volume 1.
- B. Functional and Performance Requirements:
 - 1. As described in Room Data Sheets/FF&E Narrative, Volume 1.
- C. Applicable Components:
 - 1. Furnishings for specific spaces described in Room Data Sheets, Volume 1.

E2050.40 Accessories

- A. Description: Visual display units and related accessories, as described in Room Data Sheets/FF&E Narrative, Volume 1.
- B. Functional and Performance Requirements:
 - 1. Porcelain-enameled steel sheet for markerboards: Compliant with Porcelain Enamel Institute (PEI) standard PEI-1002.
- C. Applicable Components:
 - 1. Visual display units (porcelain enamel markerboards) and related accessories.
 - 2. Through-color linoleum tack boards, minimum 1/4 inch thick.
 - 3. Fabric-Covered Tack Boards: Tackable mineral-fiber board core, 3/4 inch thickness, with flame-retardant treated fabric facing. Mounting by hook-and-loop system or Z-clips

END OF ELEMENT E

ELEMENT F – SPECIAL CONSTRUCTION AND DEMOLITION

F30 DEMOLITION

F3010 Structure Demolition

F3010.10 Building Demolition

- A. Demolish existing buildings on the project site; dispose of demolished materials legally and safely off site. Buildings to be demolished are indicated on Existing Conditions and Project Siting Diagrams (Appendices).
- B. Protect adjacent structures from damage caused by demolition activities.

F3050 Structure Moving

F3050.10 Structure Relocation

- A. If required as an alternate, salvage, disassemble, label, store and deliver (at such time requested by the county) the existing metal warehouse building on the project site for future county use

END OF ELEMENT F

ELEMENT G – SITEWORK

Extra Materials: Design Builder shall provide “added stock” materials in accordance with Project General Requirements

G10 SITE PREPARATION

G1010 Site Clearing

G1010.10 Clearing and Grubbing

- A. Description: site clearing, grubbing, and protection of existing items to remain. Protect existing trees, shrubs, groundcovers, plants, and grass to remain. Provide temporary erosion and sedimentation control measures. Remove existing trees, shrubs, groundcovers, plants, and grass. Clear and grub site as required. Strip and stockpile topsoil. Remove above- and below-grade site improvements. Disconnect, cap or seal site utilities and tunnels where required. Remove or abandon site utilities and tunnels in place as required.
- B. Functional and Performance Requirements:
 - 1. Protect and maintain benchmarks and survey control points from disturbance during construction.
 - 2. Locate and clearly flag trees and vegetation to remain or to be relocated.
 - 3. Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.
 - 4. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or abandoned in place. Arrange with utility companies to shut off indicated utilities.
 - 5. Locate, identify, disconnect, and switchover utilities indicated to be switchover. Arrange with utility companies to shut off indicated utilities.
 - 6. Locate, identify, and cap off tunnels indicated to be removed or abandoned in place.
 - 7. Locate, identify, and relocate active utilities that are in conflict with the proposed design.
 - 8. Existing Utilities: Do not interrupt utilities serving facilities within the campus that are occupied by Owner or others unless permitted. Do not proceed with utility interruptions without Owner's written permission.
 - 9. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
 - 10. Asbestos shall be removed appropriately as recommended by Design-Builder's asbestos consultant.
 - 11. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 - 12. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

13. Do not excavate within tree protection zones, unless otherwise indicated. Tree Protection Zone is defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.
14. Where utility trenches are required within tree protection zones, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.
15. Root pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.
16. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.
17. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
18. Install shoring or other protective support systems as required to minimize sloping or benching of excavations.
19. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."
20. Management of Trees and Shrubs During Site Planning, Site Development, and Construction: Comply with ANSI A300 (Part 5) – 2012.
21. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.
22. Transplanted trees require County approval.

C. Applicable Components:

1. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.
2. Materials and equipment required to implement Temporary erosion and sedimentation control measures.
3. Temporary Fencing: Install temporary fencing around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete.
4. Temporary Signage: Install temporary Tree Protection Zone signage every 25 feet along the perimeter of the Temporary Fencing. Text shall read:

TREE PROTECTION ZONE (TPZ)

DO NOT ENTER THIS AREA.
DO NOT PARK OR STORE MATERIALS IN THIS AREA.
THIS FENCE SHALL NOT BE REMOVED
WITHOUT WRITTEN AUTHORIZATION
FROM THE COUNTY.

5. Temporary Mulch- Apply 3-inch average thickness of organic mulch within drip line of trees to remain and other areas indicated. Do not place mulch within 6 inches of tree trunks.

G1070 Site Earthwork

G1070.10 Grading

- A. Description: Site grading for paved areas, structures, streets, walks, landscaped areas, and turf areas.
- B. Functional and Performance Requirements:
 - 1. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations, and maintain tolerances of plus or minus ½ inch (walks, pavements), and plus or minus 1 inch (Lawns or unpaved areas).
 - 2. Grading Inside Building Lines: Finish subgrade to a tolerance of one-half inch when tested with a 10-foot straight edge.
 - 3. On prepared subgrade, place base course under streets, pavements and walks. Shape base course to required crown elevations and cross-slope grades. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
 - 4. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade. Place drainage course that exceeds six inches in compacted thickness in layers of equal thickness, with no compacted layer more than six inches thick or less than three inches thick. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
- C. Applicable Components:
 - 1. Base Course: Material conforming to SSPWC Section 200-2.2 Crushed Aggregate Base or SSPWC Section 200-2.4 Crushed Miscellaneous Base.
 - 2. Drainage Course: Narrowly graded mixture of washed, crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a one and one-half-inch sieve and zero to five percent passing a No. 8 sieve.

G1070.20 Excavation and Fill

- A. Description: Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants, excavating and backfilling for buildings and structures, and excavating and backfilling for utility trenches.
- B. Functional and Performance Requirements-Excavating and Backfilling:
 - 1. Standard Specifications: Comply with the Standard Specifications for Public Works Construction (SSPWC), latest edition and supplements for rock materials. The Standards Specifications apply only to performance and materials and how they are to be incorporated into the Work.
 - 2. Comply with the recommendations provided in the site specific soils report or any applicable updates. Where general specifications and site-specific recommendations differ, the more stringent of the two guidelines should be followed.

3. Existing Facilities: Protect and maintain in satisfactory manner existing pavements, curbs, gutters, structures, conduits, fences, walls, and other facilities to remain above and below grade. Restore facilities damaged by construction operations.
4. Pumping and Draining: Excavate areas in such manner as to afford adequate drainage. Control grading in vicinity of excavated areas so ground surface will slope to prevent water running into excavated areas.
5. Protect structures, utilities, sidewalks, pavement, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
6. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in G1010.10 "Clearing and Grubbing."
7. Protect and maintain erosion and sedimentation controls, which are specified in G1010.10 "Clearing and Grubbing."
8. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
9. Excavate surfaces under walks and pavements to lines, cross-sections, elevations, and subgrades as designed.
10. Excavate trenches to gradients, lines, depths, and elevations as designed.
11. Excavate trenches to uniform widths to provide six-inch clearance on each side of pipe or conduit.
12. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
13. Excavate trenches six inches deeper than elevation required in rock or other unyielding bearing material, four inches deeper elsewhere, to allow for bedding course.
14. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
15. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner, without additional compensation.
16. Place backfill on subgrades free of mud, frost, snow, or ice.
17. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
18. Place and compact initial backfill of satisfactory soil, free of particles larger than one inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
19. Place and compact final backfill of satisfactory soil to final subgrade elevation.
20. Plow, scarify, bench, or break up sloped surfaces steeper than one vertical to four horizontal so fill material will bond with existing material.

21. Place and compact fill material in layers to required elevations. Use satisfactory soil material under grass and planted areas. Use engineered fill under building slabs, footings and foundations, steps, ramps, walks, and pavements.
 22. Place backfill and fill soil materials in layers not more than eight inches in loose depth for material compacted by heavy compaction equipment, and not more than four inches in loose depth for material compacted by hand-operated tampers or as directed by the site-specific geotechnical report.
 23. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the fill length of each structure.
 24. Excavation and backfill requirements for utility agencies line shall adhere to the agencies' requirements.
- C. Functional and Performance Requirements – Compaction:
1. Compact soil materials to not less than the percentages of maximum dry unit weight according to ASTM D 1557 as directed by the site specific geotechnical report provided by the Design Builder.
 2. Compact soils under structures, building slabs, steps, and pavements, under walkways, at bottom of utility trenches, and under lawn or unpaved areas.
- D. Applicable Components – Soil Materials:
1. Satisfactory Soils: Sand, gravel, friable earth, or non-expansive clays, subject to Testing Laboratory's approval.
 2. Unsatisfactory Soils: Expansive and other soils as defined in the project's geotechnical investigation report.
 3. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing one and one-half-inch sieve and not more than 12 percent passing a No. 200 sieve.
 4. Bedding Course: Crushed rock conforming to SSPWC Section 200.1-2 and Table 306-1.2.1.3(B).
- E. Applicable Components – Warning Tape:
1. Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, six-inches wide and four mils thick, continuously inscribed with a description of the utility. Color coding shall be according to the American Public Works Association (APWA) standards:
 - a. Blue – Potable water and fire suppression lines.
 - b. Green – Sanitary sewer and storm drain lines.
 - c. Orange – Communication, alarm, or signal lines.
 - d. Purple – Reclaimed water, irrigation, and slurry lines.
 - e. Yellow – Gas, oil, steam, petroleum, or gaseous material lines.

G20 SITE IMPROVEMENTS

G2020 Roadways and Parking Lots

G2020.10 Asphalt Pavement

- A. Description: Hot-mix asphalt paving, patching, and paving overlay.
- B. Functional and Performance Requirements:
 - 1. Manufacturer shall be registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located
 - 2. Standard Specifications: Comply with the Standard Specifications for Public Works Construction (SSPWC) and the California Department of Transportation (Caltrans), latest editions and supplements for asphalt paving work.
 - 3. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 - 4. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
 - 5. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving
 - 6. Patching: Fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface
 - 7. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - a. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent
 - 8. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - a. Base Course: Plus or minus ½ inch.
 - b. Surface Course: Plus ¼ inch (no minus).
 - 9. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - a. Base Course: ¼ inch
 - b. Surface Course: 1/8 inch
 - c. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is ¼ inch.
- C. Applicable Components:
 - 1. Coarse Aggregate: Crushed rock conforming to SSPWC 400-4.2.3.
 - 2. Fine Aggregate: Sand, rock dust, mineral filler, or a blend of these materials conforming to SSPWC 400-4.2.4. Mineral filler, if required, shall conform to SSPWC section 203-6.2.3.
 - 3. Asphalt Materials:

- a. Asphalt Binder: Paving asphalt, viscosity grade PG 64-10 conforming to Section 92 of the Caltrans Standard Specifications.
- b. Tack Coat: PG 64-10 conforming to Section 92 of the Caltrans Standard Specifications.
- c. Mixes: Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mix III-C3 PG 64-10 designed in conformance with SSPWC Section 400-4
4. Herbicide: Commercial chemical for weed control, registered by the EPA.
5. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with Caltrans Standard Specifications - Section 84 (Federal Specification No. TT-P-1952 for Blue, Red and Green paint; and State of California Standard Specification No. PTWB-01 for White, Yellow and Black paint) with drying time of less than 45 minutes.
 - a. Color: White, Yellow, Blue
6. Wheel Stops:
 - a. Precast, air-entrained concrete or
 - b. Solid, integrally colored, 96 percent recycled HDPE or commingles postconsumer and postindustrial recycled plastic; UV stabilized.
 - c. Dowels: Galvanized steel, 3/4-inch diameter, 24-inch minimum length

G2020.20 Concrete Pavement

- A. Description: Vehicular rated finished Concrete Paving
- B. Functional and Performance Requirements:
 1. Comply with ACI 301.
 2. Paving Tolerances: Comply with tolerances in ACI 117.
 3. Reinforcing bars require fabrication tolerances complying with ACI 315.
 4. Paving units to comply with ASTM C 936.
 5. Crushed Stone Sieve Analysis Percentage of Weight Passing a Square Mesh Sieve AASHTO T11 82 and T27 82. 1/4" minus aggregate gradation.
- C. Applicable Components
 1. Forms, with form-release agent.
 2. Concrete Materials, with normal-weight aggregates from a single source.
 3. Steel Reinforcement, with 25% minimum recycled content.
 4. Concrete Mixtures, with minimum 3500 psi strength at 28 days.
 5. Concrete Mixing per ASTM C94/C 94M.
 6. Concrete Surface Retarder
 7. Expansion Joint Filler Strips, per ASTM D 1751.
 8. Integral Color.
 9. Interlocking Concrete Paver Units, average compressive strength and water absorption per ASTM C 140.
 10. Bedding and Joint Materials, sieve per ASTM C 136.
 11. Edge Restraints, Aluminum.
 12. Woven Geotextile Fabric.
 13. Stabilizer binder additive, non-toxic organic binder.
 14. Subgrade (see G1070).

G2020.80 Exterior Parking Control Equipment

- A. Description: System operations shall include parking lot (and parking structure) entry/exit lanes with License Plate and Vehicle Identity technology (LPR), Automatic Pay Stations (Credit Card and cash only) and PARCS server with Work Station. The PARCS server shall be located inside the MDF closet installed in a rack system.
- B. Functional and Performance Requirements:
 - 1. Monthly parker shall include both proximity card and LPR technology. Each lane will include proximity card readers, (1) overview camera viewing each parking lane, and (2) LPR cameras viewing license plates of each vehicle entering and exiting the parking lot or structure. The exit lane only will include VRS-VP, Vehicle Inspection Package. LPR and VRS-VP shall provide valuable information as to the identity of the vehicles. Information collected and shall be used for billing purposes, Identification and access of permit holders/monthly parkers, security alerts for problematic vehicles or enforcement violators. Upon entry to the parking facility, a snapshot of the license' plate is taken and the barrier gate arm is raised once the monthly parkers license plate number has been recognized. If the monthly parker uses a different vehicle a proximity card can be used until the regular vehicle is used. The LPR & VRS-VP units shall integrate seamlessly into the PARCS management software.
 - 2. Visitors entering the garage will take a ticket from the entry lane. Exit from the garage for visitors will be by validation or by Pay On foot (POF) stations or exit pass machines. POF will take credit cards or cash. Exit pass machines will take credit cards only.
- C. Applicable Components:
 - 1. Entry lane terminal is a ticket issuing and access control device
 - 2. Exit lane terminal is an automatic ticket/verification reader and access control device.
 - 3. Card reader terminal is an access control device.
 - 4. Barrier Gates.
 - 5. Pay On Foot stations.
 - 6. Cashier terminal.
 - 7. Management software terminal.
 - 8. Credit card processing server.
 - 9. Traffic marking paint – White (stalls, directional markings, lettering, International Symbol of Accessibility), yellow with 3-inch black border (directional markings), red (fire lanes), blue (match No 15090, Fed. Std. 595A), for International Symbol of Accessibility.
 - 10. Glass Beads: Reflective type, conforming with Fed. Spec. TT-B-1325, Type I, Gradation A.
 - 11. Wheel Stops: Precast, air-entrained concrete or solid, integrally colored, 96 percent recycled HDPE or commingled postconsumer and postindustrial recycled plastic; UV stabilized.
 - 12. Dowels: Galvanized steel, 3/4-inch diameter

G2030 Pedestrian Plazas and Walkways

G2030.10 Pedestrian Pavement

- A. Description: 4" thick pedestrian-rated finished Concrete Paving; Decorative Unit Pavers; Stabilized Decomposed Granite at pedestrian circulation areas, fitness zones and courtyards. Exterior cement concrete pavement for the following: Exterior steps, exterior ramps, driveways and roadway and curbs and gutters.
- B. Functional and Performance Requirements:
 - 1. Comply with ACI 301.
 - 2. Paving Tolerances: Comply with tolerances in ACI 117.
 - 3. Reinforcing bars require fabrication tolerances complying with ACI 315.
 - 4. Paving units to comply with ASTM C 936.
 - 5. Gradation of Decomposed Granite Material per ASTM C 126.
 - 6. Crushed Stone Sieve Analysis Percentage of Weight Passing a Square Mesh Sieve AASHTO T11 82 and T27 82. 1/4" minus aggregate gradation.
- C. Applicable Components
 - 1. Forms, with form-release agent.
 - 2. Concrete Materials, with normal-weight aggregates from a single source.
 - 3. Steel Reinforcement, with 25% minimum recycled content.
 - 4. Concrete Mixtures, with minimum 3500 psi strength at 28 days.
 - 5. Concrete Mixing per ASTM C94/C 94M.
 - 6. Concrete Surface Retarder
 - 7. Expansion Joint Filler Strips, per ASTM D 1751.
 - 8. Integral Color.
 - 9. Interlocking Concrete Paver Units, average compressive strength and water absorption per ASTM C 140.
 - 10. Bedding and Joint Materials, sieve per ASTM C 136.
 - 11. Edge Restraints, Aluminum.
 - 12. Woven Geotextile Fabric.
 - 13. Stabilizer binder additive, non-toxic organic binder.
 - 14. Subgrade (see G1070).

G2030.15 Pedestrian Unit and Aggregate Surfacing Pavement

- A. Description: Decorative Unit Pavers; Stabilized Decomposed Granite at pedestrian circulation areas and courtyards.
- A. Functional and Performance Requirements:
 - 1. Paving units to comply with ASTM C 936.
 - 2. Gradation of Decomposed Granite Material per ASTM C 126.
 - 3. Crushed Stone Sieve Analysis Percentage of Weight Passing a Square Mesh Sieve AASHTO T11 82 and T27 82. 1/4" minus aggregate gradation
- B. Applicable Components:
 - 1. Interlocking Concrete Paver Units, average compressive strength and water absorption per ASTM C 140.
 - 2. Bedding and Joint Materials, sieve per ASTM C 136.

3. Edge Restraints, Aluminum.
4. Woven Geotextile Fabric.
5. Stabilizer binder additive, non-toxic organic binder.
6. Subgrade (see G1070).

G2060 Site Development

G2060.20 Fences and Gates

- A. Description: Chain link utility area fencing, decorative perimeter fencing separating public right-of-way's from internal open spaces, pedestrian gate at entry points to internal outdoor spaces, and vehicular gate at emergency vehicle access entry.
- B. Functional and Performance Requirements:
 1. Compliance with ASTM F 1553, ASTM F 1043, and the Chain Link Fence Manufacturers Institute Product Manual and WLG 2445.
 2. Compliance with regional SSPWC or statewide Caltrans standards for fencing.
 3. Wind Load resistance capacity per Building and Site Design Criteria (Structural).
- C. Applicable Components
 1. Steel Chain Link Fabric.
 2. Round Steel Pipe Fence Framework.
 3. Tension Wire.
 4. Fittings.
 5. Tie Wire and Hog Rings.
 6. Fence Hardware.
 7. Steel, iron and/or wood pickets, rails, and posts.
 8. Steel, iron and/or wood gate leaves.
 9. Gate hardware with locking mechanisms.
 10. Concrete post footings, with a 28-day compressive strength of 2,500 psi (17.2 MPa) minimum.

G2060.25 Site Furnishings

- A. Description: Moveable site furnishings.
- B. Functional and Performance Requirements:
 1. Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.
 2. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
 3. Install site furnishings level, plumb, true and positioned at locations indicated on drawings.
 4. Provide temporary protection over all installed site furnishings. Remove protection at substantial completion, or when directed by owner.

C. Applicable Components

1. Metal components – formed to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
2. Finishes –manufacturer’s standard finish complying with finish manufacturer’s written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

G2060.30 Exterior Signage

- A. Description: Monument sign, building identification signage, traffic signage, vehicular directional and informational signage, building entry notice, and regulatory signage. Please refer to Building and Site Design Criteria (Signage and Wayfinding), Volume 1, for additional information.
- B. Functional and Performance Requirements:
 1. Comply with City and County signage ordinances for exterior signs.
 2. Comply with California Building Code requirements for accessibility related signage.
 3. Comply with local fire authority requirements for fire/life safety related signage.
- C. Applicable Components:
 1. Monument sign, internally or externally illuminated, with concrete base.
 2. Flat cut aluminum letters, paint finish, pin mounted to wall.
 3. Flat cut aluminum numerals, paint finish, pin mounted to wall.
 4. Aluminum panel sign with screen printed copy.
 5. Post and panel sign: Aluminum panel with paint finish and applied vinyl film copy, with clear coat, mounted on aluminum post with concrete footing, or direct mounted to fence.

G2060.35 Flagpoles

- A. Description: Ground mounted flag poles made from aluminum.
- B. Functional and Performance Requirements:
 1. Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
 - a. Seismic Loads: Per code requirements and authorities having jurisdiction
 - b. Wind Loads: Per code requirements and authorities having jurisdiction. Minimum design factor shall be 120 mph according to MAAMMFP 1001, “Guide Specifications for Design of Metal Flagpoles.”
 - c. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.
 2. Finish Requirements shall comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products”. Noticeable variations in same piece are not

acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Applicable Components:

1. Aluminum Flagpole
2. Metal Foundation Tube – Manufacturer’s standard corrugated steel foundation tube with bottom plate, and support plate, steel ground spike and steel centering wedges.
3. Sleeve for Aluminum Flagpole – PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation
4. Hinged Baseplate - Cast-metal tilting hinged base and anchored plate joined by permanently secured pivot rod. Provide with stainless-steel screws for securing tilting base to anchored plate when not tilted; provide with anchor bolts.
5. Fittings – Finial Ball, Internal Halyard Winch System, Halyard Flag Snaps
6. Non shrink metallic grout - Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107
7. Drainage Material – Crushed stone, or crushed or uncrushed gravel; coarse aggregate
8. Sand complying with ASTM C 33, fine aggregate
9. Elastomeric Joint Sealant
10. Bituminous paint – cold applied asphalt emulsion complying with ASTM D 1187

G2080 Landscaping

G2080.10 Planting Irrigation

- A. Description: Automatic irrigation system with drip irrigation for planting areas, and overhead spray irrigation for turfgrass sod areas. Landscape irrigation components shall meet the requirements for recycled water systems (purple pipe) in anticipation of future availability.
- B. Functional and Performance Requirements:
 1. Irrigation design water use must comply with the State of California Model Water Efficient Landscape Ordinance.
 2. Irrigation design, installation and signage must comply with the County of Los Angeles – Department of Health Services Guide to Safe Recycled Wastewater Use, Pipeline Construction and Installation.
 3. Comply with Downey Municipal Code Section 9520.04 Landscaping Requirements.
 4. All irrigation must occur within an 8-hr watering window.
 5. System shall have sprinkler heads with application rates that do not exceed the infiltration rate of the soil. Install with dual or multiple program controllers that permit cycles of 5 – 10 minutes per hour.
 6. Minimum working pressures: Irrigation main piping 200 psig; circuit piping 150psig.
 7. All plastic pipe shall be extruded of an improved PVC virgin pipe compound in accordance with ASTM D2672, ASTM D2241 or ASTM D1785.

8. All fittings shall conform to ASTM D2464 and ASTM D2466.
9. All threaded nipples shall be standard weight Schedule 80 with molded threads and shall conform to ASTM D1785.
10. Solvent cementing shall be in conformance with ASTM D2564 and ASTM D2855.

C. Applicable Components:

1. PVC Pipe, non-pressure rated, with fittings and socket unions; wall thickness as required by minimum working pressures. Purple colored pipe with continuous wording "Caution Recycled Water" printed on opposite sides of the pipe.
2. PVC Pipe, pressure rated, with fittings and socket unions; wall thickness as required by minimum working pressures. Purple colored pipe with continuous wording "Caution Recycled Water" printed on opposite sides of the pipe.
3. Solvent cement for joining PVC piping.
4. Manual Gate Valves, brass, resilient seated.
5. Automatic control valves, plastic.
6. Automatic Drain Valves, corrosion-resistant.
7. Sprinklers, surface spray and pop-up. Include purple covers.
8. Drip Emitters with drip tubing.
9. Quick Couplers with locking-top option. Vinyl quick coupler cover to be purple in color with the words "Caution-Recycled Water-Do Not Drink" permanently marked on lid.
10. Controllers with rain sensor, timing device and switch for manual or automatic operation of stations.
11. Valve Boxes, concrete, permanently marked (attached tags are not acceptable) on valve box cover plate with the words "Caution-Recycled Water- Do Not Drink."
12. Basket Strainer downstream of Point of Connection.
13. Recycled water marking tape installed above mainline within trench.
14. Purple Recycled Water valve ID tags at all Remote Control Valves, shut-off valves, quick coupler valves.
15. Recycled water signage.

G2080.20 Turf and Grasses

- A. Description: Turfgrass sod on activity/event lawn areas.
- B. Functional and Performance Requirements:
 1. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding."
 2. Turf Postfertilization: fertilizer to provide actual nitrogen of min. 1 lb/1000 sq. ft. to turf area.
 3. Comply with Downey Municipal Code Section 9520.04. Landscaping Requirements.

C. Applicable Components:

1. Turfgrass Sod, with uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
2. Planting Soil (see G2080.80).
3. Irrigation (see G2080.10).
4. Drainage (see G3030).
5. Subgrade (see G1070).

G2080.30 Plants

A. Description: Trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers or herbaceous vegetation.

B. Functional and Performance Requirements:

1. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required.
2. Comply with Downey Municipal Code Section 9520.04. Landscaping Requirements.
3. New trees shall consist of the following box sizes upon planting: 25% of trees shall be min. 36" box; 50% shall be min. 48" box; 15% shall be min. 60" box; 10% shall be min. 72" box.
4. Ornamental planting materials shall consist of the following container sizes upon planting: 50% shall be min. 1 gallon; 25% shall be min. 5 gallon; 25% shall be min. 15 gallon.
5. Spacing of ornamental planting shall conform to the following spacing requirements: max. 24" o.c. spacing for 1 gallon material; max. 30" o.c. spacing for 5 gallon material; max. 48" o.c. spacing for 15 gallon material unless species mature size warrants an increase in spacing dimension.

C. Applicable Components:

1. Nursery-grown plants with healthy root systems, well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf.
2. Organic mulch, decorative aggregate mulches.
3. Wood stakes and/or Below-ground anchoring systems for tree stabilization.
4. Steel landscape edging with steel anchor stakes.
5. Modular root barrier panels with vertical root deflecting ribs.
6. Water-insoluble emulsion antidessicant, permeable moisture retarder, film forming, for trees and shrubs.
7. Planter Drainage Gravel: Washed, sound stone or gravel complying with ASTM C33 for Size No. 7.
8. Nonwoven geotextile planter filter fabric manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination.
9. Pesticides registered and approved by EPA, as required.
10. Planting Soil (see G2080.80).
11. Irrigation (see G2080.10)

G2080.80 Landscaping Activities - Planting

- A. Description: Imported soils, fertilizers, soil amendments, and structural soils applied for planting areas.
- B. Functional and Performance Requirements:
 - 1. Standard Soil Test Procedures and Analysis to be performed, per ASTM F1632.
 - 2. Finish grading tolerance: ½ inch variance in 20 feet.
 - 3. Compaction: Compact each blended lift of planting soil as defined in the project's geotechnical investigation report.
 - 4. Imported Planting Topsoil to consist of sandy clay loam or clay loam according to USDA textures, alternate soil textures may be provided pending compliance with Amended Planting Soil Criteria.
 - 5. Imported Planting Topsoil- Physical soil parameters: Clay: 5%, Silt: 25-50%; Sand: 25-50%.
 - 6. Imported Planting Topsoil- Percentage of Organic matter: minimum 4-8%.
 - 7. Imported Planting Topsoil- Soil reaction: pH of 6 – 7.4.
 - 8. Imported Planting Topsoil- CEC of Total Soil: Minimum 12 meq/100 mL at pH of 7.0. Maximum 25 meq/100 mL.
 - 9. Imported Planting Topsoil- Soluble Salt Content: 1 to 2 dS/m measured by electrical conductivity.
- C. Applicable Components:
 - 1. Imported Planting Soil – Ornamental Planting.
 - 2. Imported Planting Soil – Turf and Seed Areas.
 - 3. Inorganic Soil Amendments, added as indicated by the Soil Testing Agency to achieve amended planting soil requirements.
 - 4. Organic Soil Amendments, added as indicated by the Soil Testing Agency to achieve amended planting soil requirements.
 - 5. 5300 spores per lb of vesicular arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.
 - 6. Fertilizers, added as indicated by the Soil Testing Agency to achieve amended planting soil requirements.
 - 7. Pesticide, registered and approved by EPA, as required.
 - 8. Pre-emergent herbicide, selective and non-selective, as required.
 - 9. Post-emergent herbicide, as required.
 - 10. CU Structural Soil, as required beneath paving.

G30 LIQUID AND GAS SITE UTILITIES

G3010 Water Utilities

G3010.10 Site Domestic Water Distribution

- A. Description: Pressurized potable water supply system.
- B. Functional and Performance Requirements:
 - 1. Comply with NSF 14 for plastic potable-water-service piping.

2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.
3. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing and then only after arranging to provide temporary utility services according to requirements indicated. Notify Owner's Representative not less than one week in advance of proposed utility interruptions. Do not proceed with utility interruptions without Owner's Representative's written permission.
4. Prevent damage to materials during loading, transportation, and unloading. Store equipment with moving parts off ground on platforms or skids.
5. Clearance of Water Line (Building or Structure): 2 feet minimum horizontal separation.
6. Sewer Crossing (Typical): Lay water mains over sanitary sewers to provide minimum vertical separation of 3 feet.
7. For sewers less than 3 feet below the water pipe, Install water line with all joints located at least 4 feet from each side of the sewer pipe. Encase sewer pipe in 6 inches of concrete around pipe; extend concrete encasement 4 feet either side of water main.
8. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches for all lines NPS 3 or greater.
9. Install backflow prevention devices according to requirements of plumbing and health department and authorities having jurisdiction. Working Pressure: 175 psi minimum, unless otherwise approved.
10. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. Refer to G1070.20 for tape specifications.
11. The piping shall be subjected for a minimum of two hours to a pressure of one and one-half times the working pressure, but in no case less than 150 psi. Examine all exposed pipe, joints, fittings and accessories during the test period. Allowable leakage shall be as specified in AWWA C-600, Table 3. Replace or repair defective portions of the system, and repeat tests until results are satisfactory.
12. Water distribution shall adhere to City of Downey's requirements as necessary. Follow the most stringent requirements.

C. Applicable Components:

1. Pipe and Fittings: PVC Schedule 40 or PVC, AWWA C900 Pipe.
2. Glands, Gaskets, and Bolts: Use corrosion resistant, high strength, low alloy steel, bolts and nuts where in contact with corrosive soil ASTM A 325.
3. Corrosion-Protection Encasement for Underground Metal Piping (if required by conditions documented in geotechnical report): ASTM A 674 or AWWA C105, PE film, 0.008-inch minimum thickness, tube or sheet.
4. Water Meters: Water meters shall be installed in accordance to the local water utility requirements.
5. Backflow-Prevention Devices: FM Approved, AWWA, UL Classified, Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California. Acceptable types as listed in following paragraphs.

6. Reduced-Pressure-Principle Backflow Preventers: Suitable for continuous pressure application.
7. Reduced-Pressure-Detector Assembly Backflow Preventers: Suitable for continuous pressure application.
8. Double-Check-Valve Backflow Prevention Assemblies: Suitable for continuous pressure application.
9. Double-Check-Detector Assembly Backflow Preventers: Suitable for continuous pressure application.

G3010.30 Site Fire Protection Water Distribution

- A. Description: Pressurized fire water supply system.
- B. Functional and Performance Requirements:
 1. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
 2. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
 3. Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
 4. Refer to G3010.10 for additional criteria
- C. Applicable Components
 1. UL/FM-Type Fire Hydrants: Comply with NFPA 24.
 2. Fire Department Connections: Exposed, Freestanding, Fire Department Connections or Building-Face-Mounted Fire Department Connections.
 3. Refer to G3010.10 for additional criteria

G3010.50 Site Irrigation Water Distribution

- A. Description: Pressurized irrigation water supply system
- B. Functional and Performance Requirements:
 1. Reference G3010.10 and G2080.10
- C. Applicable Components:
 1. Reference G3010.10 and G2080.10

G3020 Sanitary Sewerage Utilities

G3020.20 Sanitary Sewerage Piping

- A. Description: Gravity-flow, non-pressure sanitary sewerage requirements outside the building.
- B. Functional and Performance Requirements:
 1. Gravity-Flow, Non-pressure, Drainage-Piping Pressure Rating: 10-foot head of water.

2. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects. Do not enclose, cover, or put into service before inspection and approval. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice. Submit separate report for each test.
3. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction.
4. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and UNI-B-6.
5. Option: Test plastic gravity sewer piping according to ASTM F 1417.
6. Leaks and loss in test pressure constitute defects that must be repaired.
7. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

C. Applicable Components:

1. Pipe and Fittings: ASTM A 74, Service class.
2. Gaskets: ASTM C 564, rubber.
3. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.
4. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
5. Standard precast concrete manholes.
6. Manhole Covers: Include indented top design with lettering cast into cover, using wording "SANITARY SEWER."
7. Gray-Iron or PVC cleanouts.

G3030 Storm Drainage Utilities

G3030.20 Storm Drainage Piping and Drainage Structures

- A. Description: Gravity-flow, non-pressure storm drainage pipe and drainage structures outside the building.
- B. Functional and Performance Requirements: Piping and Drainage Structures
 1. Gravity-Flow, Non-pressure, Drainage-Piping Pressure Rating: 10-foot head of water.
 2. General: Install manholes, complete with appurtenances and accessories indicated.
 3. Install precast concrete manhole sections with sealants according to ASTM C 891.
 4. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.
 5. Set frames and grates to elevations indicated.
- C. Functional and Performance Requirements: Pipe Couplings
 1. Pipe couplings and fittings with pressure ratings at least equal to piping rating may be used in applications specified, unless otherwise indicated.

2. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
3. Shielded flexible couplings for same or minor difference OD pipes.
4. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
5. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
6. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
7. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-gasket joints.
8. Join dissimilar pipe materials with non-pressure-type flexible couplings.

D. Applicable Components:

1. Pipe and Fittings: ASTM A 74, Service class.
2. Gaskets: ASTM C 564, rubber.
3. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.
4. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
5. PVC Sewer Pipe and Fittings, NPS 18 and Larger: ASTM F 679, T-2 wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
6. Standard Precast Concrete Manholes, unless otherwise approved.
7. Manhole Covers: Include indented top design with lettering cast into cover, using wording "STORM DRAIN."
8. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.
9. Standard Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
10. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron. Grate Free Area: Approximately 50 percent, unless otherwise approved.

G3030.60 Site Subdrainage

- A. Description: Subdrainage systems for retaining walls, and other site subdrainage systems.
- B. Functional and Performance Requirements:
 1. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Lay perforated pipe with perforations down.
 - a. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated.
 - b. Underslab Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent.
 2. Install PE piping according to ASTM D 2321.
 3. Install PVC piping according to ASTM D 2321.

4. Join PE pipe, tubing, and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties."
5. Join perforated, PE pipe and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties"; or according to ASTM D 2321.
6. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.
7. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.

C. Applicable Components:

1. Underground Subdrainage Piping: Perforated PE pipe and fittings, couplings, and coupled joints; perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.
2. Perforated plastic pipe shall be either smooth wall polyvinyl chloride plastic pipe, corrugated polyvinyl chloride plastic pipe with a smooth interior surface, or corrugated polyethylene plastic tubing. Smooth wall polyvinyl chloride plastic pipe shall conform to the requirements in AASHTO Designation M 278. Corrugated polyvinyl chloride plastic pipe with a smooth interior surface shall conform to the material and structural requirements in AASHTO Designation M 278. The pipe shall have perforations located in the bottom half of the pipe, and the perforations shall consist of slots meeting the size and opening area requirements in AASHTO Designation M 252. The inside diameter and diameter tolerances shall conform to the requirements of either AASHTO Designations M 252 or M 278. Corrugated polyethylene plastic tubing shall conform to the requirements in AASHTO Designation M 252 or M 294.
3. Pipe Perforations- NPS 4: four rows of perforations per ASTM F 758, section 7.2.4., and Table 5.
4. Pipe Perforations - NPS 6 and 8: Four rows of perforations per ASTM F 758, section 7.2.4., and Table 5.
5. Pipe Perforations - NPS 10 and larger: Six rows of perforations per ASTM F 758, section 7.2.4., and Table 5.
6. Polyvinyl chloride pipe shall be connected with belled ends, or with sleeve type or stop type couplings conforming to the requirements in AASHTO Designation: M 278. Polyethylene tubing shall be connected with snap on, screw on, or wrap around fittings and couplings conforming to the requirements of AASHTO Designation: M 252 or M 294. Solvent cementing of joints will not be required.
7. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.
8. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.
9. Molded-Sheet Drainage Panels: Prefabricated geocomposite, 36 to 60 inches wide with drainage core faced with geotextile filter fabric.

10. Prefabricated Drainage Core: Three-dimensional, nonbiodegradable, molded PP or PS. Select prefabricated drainage core recommended by the manufacturer for the type of application specified elsewhere in the contract documents. Minimum Compressive Strength: 10,000 pound force (lbf)/square foot according to ASTM D 1621. Minimum In-Plane Flow Rate: Ten gallons per minute (gpm)/foot according to ASTM D-4716.
11. Filter Fabric: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; Grab Elongation: 60 percent maximum according to ASTM D-4632. Apparent Opening Size: No. 70 sieve, minimum according to ASTM D-4751. Water Flow Rate: 165 gpm/square foot according to ASTM D-4491.
12. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gallons per minute (gpm)/square foot when tested according to ASTM D 4491. Structure Type: Nonwoven, needle-punched continuous filament or woven, monofilament or multifilament. Style(s): Flat and sock.
13. Backfill, drainage course, impervious fill, and satisfactory soil materials as specified in G1070 Site Earthwork.

G40 ELECTRICAL SITE IMPROVEMENTS

G4010 Site Electric Distribution Systems

G4010.10 Electrical Utility Services

- A. Description: New 12kV utility service shall be extended from offsite SCE point of service to the new 12kV switch gear in the electrical utility yard. Electrical service shall be extended from this utility yard to Parcel B, 12KV-277/408V pad mounted transformer and ultimately connected to the main 277/480v, 3 phase, 4 wire switchgear/switchboard(s) within each building.

G4010.20 Electric Transmission and Distribution

- A. Description: 277V/480V for lighting and air conditioning via PVC conduits for underground applications, EMT conduits for interior concealed and rigid steel conduits for exterior and areas subject to damage.

G4010.40 Electrical Transformers

- A. Description: 12KV/480 delta-wye 55/65 degree, NEMA 3R with bio-degradable oil. 480/120/208 V, delta-wye copper winding K-13 rated for interior application.

G4010.50 Electrical Switchgear and Protection Devices

- A. Description: Refer to D50 for description, functional performance requirements, and applicable components.

G4010.70 Site Grounding

- A. Description: Refer to D50 for description, functional performance requirements, and applicable components, but in general grounding shall be based on California Electrical Code (CEC).

G4050 Site Lighting

G4050.10 Area Lighting

- A. Description: Refer to D50 for description, functional performance requirements, and applicable components. Coordinate all exterior lighting with landscape architect.

G4050.20 Flood Lighting

- A. Description: Refer to D50 for description, functional performance requirements, and applicable components.

G4050.50 Building Illumination

- A. Description: Refer to D50 for description, functional performance requirements, and applicable components.

G4050.90 Exterior Lighting Supplementary Components

- A. Description: Refer to D50 for description, functional performance requirements, and applicable components.

G50 SITE COMMUNICATIONS

G5010 Site Communications Systems

G5010.10 Site Communications Structures

- A. Description: Underground ducts, manholes, and handholes within the site. Dedicated manholes and ducts will connect the new building(s) to the south campus infrastructure. Conduit runs should be concrete encased and capped at both ends. Separate redundant connections to different parts of the building supplied from different connection points are required for the two service provider connections as a minimum. County use conduit shall be connected in at least one location. Each service provision will contain at least two 4" conduits. The creation of a conduit loop for future redundancy and connectivity requirements should be achieved within the site parcel. County only use conduit should also be installed between the building(s) and the parking structure, connecting to the lowest distribution rooms within the structure.
- B. Functional and Performance Requirements:
 - 1. Service Provision Conduit: conduits connecting to manholes shall be PVC, and continuous. Conduits will adhere to the TIA 758-B requirements for depth of installation, bend radii, and encasement. A minimum bend of 10x OD of the conduit should be installed. Each conduit will be capped and labeled both within the building and at the manhole.

2. Horizontal Cable Conduit: conduits for horizontal cabling within the site will be a continuous run from the building termination location to the weatherproof outlet box at the device.
3. All conduits will be sealed to prevent water egress into the building.
4. The maximum pull length between manholes should be no more than 400 feet. Additional manholes should be located within the site to achieve this requirement.

C. Applicable Components:

1. Service Provision Conduit: conduits connecting to the manholes shall be schedule 40 or Schedule 80 - 4" in size. Each conduit will contain three (3) rigid inner ducts.
2. County Only Use Conduit: conduits connecting to the manholes on the site or between buildings will be schedule 40 or Schedule 80 - 4" in size. Each conduit will contain three (3) rigid inner ducts.
3. Horizontal Cable conduit: will be schedule 80 – 2" conduit.
4. Manholes will be a minimum of 36"x 60"x 36" with a torsion parkway cover marked "Telecom" and a 5/8" x 8' ground rod driven 7' into the ground. If exposed to traffic heavy duty lids will be provided with concrete construction.
5. Handholes will be a minimum of 24"x 36"x 24" with a cover marked "Telecom" and a 5/8" x 8' ground rod driven 7' into the ground.

G5010.30 Site Communications Distribution

- A. Description: Service providers will be responsible for providing all cable connections to their networks along with associated hardware. Horizontal cabling will be installed to ANSI/TIA standards. Outlets within the parcel for required devices external to the building will terminate within the building termination cabinet on a patch panel one end and within a weatherproof enclosure at the device location. This cable will be provided as part of the buildings single manufacturer cabling solution and covered by the same warranties and guarantees. Backbone fiber and copper cable requirements between the building(s) and the parking structure have been described within section D60 of the specifications.
- B. Functional and Performance Requirements:
 1. Category grade copper cable will be Category 6 or 6A, this should be standards compliant or better and rated for use in an external environment.
 2. Indoor / Outdoor rated Optical fiber will only be used for runs which exceed the maximum horizontal cable distance for copper. Multimode OM4 fiber is acceptable, with single mode being acceptable only if absolutely required for the intended use. All Fiber installed to locations external to the building will be terminated within weatherproof enclosures and rated for use within an external environment.
- C. Applicable Components:
 1. Category Cat 6/6A cable will be terminated within NEMA 4r rated UL housings.
 2. Multimode OM3 or OM4 fiber is acceptable, with single mode being acceptable only if required for intended device. External fiber connections will be

terminated within a weather proof NEMA 4r rated enclosure. Allowances for additional power will also be required for fiber outlet locations.

G5010.50 Wireless Communications Distribution

- A. Description: Provide Wireless Communications Distribution coverage for all exterior areas in accordance with Element D.

END OF ELEMENT G