Version 2024.1

LONG BEACH UNIFIED • SCHOOL • DISTRICT

TABLE OF CONTENTS

PART 1 – PREFACE

The following specifications represent the District's requirements. There is a combination of both outline specifications and master specifications for the various sections that may apply to your specific project. The master specification sections are provided in Word format for editing by the Design Professionals to make it project specific and are to be incorporated into the project manual. The outline specification sections include requirements that are to be integrated into the master specifications of the Design Professionals choice and edited as appropriate to meet the specific project requirements. It is not the intent to address all items required for all projects. Materials, products, and items not listed are to be recommended by the Design Professional and reviewed by the designated District Representative. The information is **not** intended to be "cut and pasted" into the construction documents nor is this a substitute for the outline specifications required by Volume 3, Document Standards.

Mock-ups and pre-installation meetings are not required in all cases. The Design Professional must judge the complexity of the work and make the determination if either is appropriate for the job. The District prefers mock-ups and to include pre-installation conferences for all but the simplest installations. The Design Professional is to recommend and obtain District approval of mock-up requirements prior to finalizing bid documents.

MODIFICATIONS TO THE SPECIFICATIONS

The District welcomes suggestions to improve these specifications; however, deviations from these standards need to be specifically approved, in writing, by the District's designated representative. Please refer to the **Variance Request Form** (Appendix G of Volume 1). It is the objective that continued input from the Design Professionals, District, and other stakeholders will result in continuous improvement of the design standards.

As a result of enlisting comments from users and changing codes and products, this document will be continuously evolving. The most current versions are available at the District's website at www.lbschools.net. Please coordinate with the designated District Representative to ensure you are on the notification list for updated postings. If a change to these standards affects your contract in terms of time or money, notify the designated District representative in writing immediately.

BIDDING AND CONTRACT REQUIREMENTS

The "front-end" inclusive of bid form, bid instructions, General Conditions, insurance and contractual requirements are provided by the District and edited for specific project requirements. The Design Professional is to coordinate with the designated District Representative to obtain copies.

The Design Professional must assist the District in the preparation of the front-end documents by submitting with the bid set:

List of Alternates, deductive and additive.

List of Allowances

Suggested duration of construction

Brief description of the work, including phasing requirements

Construction Cost Estimate

GENERAL REQUIREMENTS, DIVISION 1

Warranty: Provide a general one-year warranty from the General Contractor on the entire project. The warranty shall commence upon issuance of the Notice of Completion as determined by the District. In addition, provide the specific sub-contractor or manufacturer warranty requirements that are beyond the one-year.

The Design Professional must coordinate the technical specifications with the District's Division 1 requirements.

EXTRA STOCK

The Design Professional must coordinate with the District which specifications shall include extra stock items. This is to be determined on a project by project basis. Deliver tools, spare parts, extra materials / extra stock, and similar items to location designated by District. Label with manufacturer's name and model number where applicable.

END OF PREFACE

PART 2 – OUTLINE SPECIFICATIONS

DIVISION 3 – CONCRETE

03 30 00 CAST-IN-PLACE CONCRETE

Part 1 – General

A. Related Sections

1. 09 96 23: Graffiti-Resistant Coatings

Part 2 – Products

Note to Design Professional: Do not specify colored concrete.

Part 3 – Execution

A. Vertical and decorative concrete shall be sacked and patched and receive an anti-graffiti coating.

B. Finishes: medium broom finish or top-cast etching at horizontal concrete.

DIVISION 4 – MASONRY

04 22 00 CONCRETE UNIT MASONRY

Part 1 – General

A. Related Sections

1. 03 20 00: Concrete Reinforcement
2. 03 30 00: Cast in Place Concrete
3. 07 60 00: Sheet Metal Flashing
4. 09 99 00: Painting
5. 09 96 23: Graffiti Resistant Coatings

B. Submittals

Note to Design Professional:

- Prohibit high-lift block grouting procedures.
- Require four-foot square mock-ups for non-standard installations or finishes.
- Require color samples from full range of available colors.
- Coordinate and specify testing lab requirements.

- Fluted CMU is prohibited.

Part 2 – Products

A. Manufacturers
   1. Concrete Masonry Unit
      a. Angelus http://www.angelusblock.com/
      b. Orco http://www.orco.com/
      c. Or Approved Equal

B. Mortar
   1. Dry Block by Grace Construction Products http://www.na.graceconstruction.com/prodline.cfm?did=27
   2. Or Approved Equal

C. Mortar
   1. Integral water-repellant admixture.

Part 3 – Execution

A. Install concrete masonry units in 4-foot-high maximum lifts.

DIVISION 5 – METALS

05 50 00 METAL FABRICATIONS

Part 1 – General

A. Section Includes

1. Metal Ladders and cages
2. Stair Nosings
3. Pipe Bollards
4. Floor or Stair Tread Grates
5. Metal support brackets for shelves, metal screens etcetera.
6. Steel Racks and Platforms
7. Downspouts other than galvanized sheet metal.
8. Anchors and Fasteners
9. Steel members for miscellaneous metal items, bar stock, tube stock, pipe stock.

B. Related Sections

1. 03 30 00: Cast In Place Concrete
2. 06 10 00: Rough Carpentry
3. 06 20 00: Finish Carpentry
4. 09 22 16: Non-Structural Metal Framing
5. 09 24 00: Cement Plaster and Metal Lath
6. 09 29 00: Gypsum Board
7. 09 64 19: Rubber Flooring and Stair Covering
8. 09 90 00: Painting and Coating

C. Submittals

Note to Design Professional: Require shop drawings of fabricated items such as ladders, racks and platforms.

Part 2 – Products

A. Exterior metal fabricated items to be hot-dipped galvanized after fabrication.

B. Metal stair nosing

1. Aluminum, two piece, anchored into concrete, colored abrasive strips, three and a quarter inches wide by full length of steps, Balco XH-330 or approved equal.

C. Pipe bollards only to be used in utility areas, specify paint and grout fill. Install in sleeves with locking tabs, if removable bollards are required.

D. Floor and stair grates to be "heel-proof" and galvanized. Paint finish is not acceptable.

E. Downspouts are to be galvanized, field painted, Schedule 40 steel-pipe.

F. Anchors and fasteners to have an ICC-ES report in all cases.

Part 3 – Execution

A. Downspouts to have welded joints. Threaded and collard joints are not acceptable.

B. Fasteners and nuts to have vandal proof heads or damaged threads in non-secure areas.

DIVISION 6 – WOOD, PLASTIC, AND COMPOSITES

06 40 00 ARCHITECTURAL WOODWORK

Part 1 – General

Note to Design Professional: Specify laboratory casework in section 12 35 53 Laboratory Casework.

A. Related Sections

1. 06 10 00: Rough Carpentry
2. 06 20 00: Finish Carpentry
3. 09 90 00: Painting and Coating
4. 12 35 53: Laboratory Casework

B. Reference Standards

1. Comply with Woodwork Institute.

C. Submittals

1. Require shop drawings including plans and elevations.
2. Require samples of transparent finishes on the wood choice.
3. Require WI certification on the cover of the shop drawings.

D. Delivery, Storage, and Handling

1. Store all material in protected and dry environment.

Part 2 – Products

A. Cabinets: To be constructed in accordance with WI - Custom Grade requirements.

1. Use medium-density fiberboard.
2. Use formaldehyde-free, environmentally preferable materials and low VOC adhesives.
3. Use ¾-inch plywood for shelving cores.

4. Drawer bottoms to be 1/4-inch plywood with melamine finish.

B. Hardware

1. Hinges: heavy duty, 5-knuckle institutional hinge; mill ground with hospital tips, 270 degree; Rockford Process RPC 376 http://www.rockfordprocess.com/ or approved equal.
2. Drawer Glides: heavy-duty, full extension, ball bearing, drawer glides http://www.drawerslides.com/c/blum-tandem-568h or approved equal.
3. Locks:
   a. Zinc die cast lock body with solid brass pin tumbler cylinder, Olympus Lock, Inc. Small Pin, N Series, 100/200 deadbolt lock, GM2 master key.
   b. All casework shall lock. All casework in a room shall be keyed alike and each room should be keyed differently. All locks are to be master keyed with one master key for all casework.
4. Pull Handles: metal wire pull handles http://rockfordprocess.com/hardware/pulls/ or approved equal
5. Strikes and Other Miscellaneous Hardware: Olympus Lock, Inc., 12-4-ZP, as needed
6. Other Miscellaneous Hardware: Olympus Lock, Inc.

C. Finish Carpentry

1. Use woods that are certified by the Forest Stewardship Council (FSC) http://www.fscus.org/ where practical and available.

Part 3 – Execution

A. Lumber shall exhibit no growth of fungus when installed.

B. Seal between countertops and wall.

C. Install backsplashes at countertops.

D. Drawer bottoms to be fully let-in, glued and blocked.

E. All joinery must be lapped and mitered, no butt joints.

F. All material must be acclimated prior to installation.

DIVISION 7 – THERMAL AND MOISTURE CONTROL

07 13 26 SELF-ADHERING SHEET WATERPROOFING AT CLAY TILE ROOFING

Part 1 – General

Note to Design Professional: Specify this Self-Adhering SBS Modified Sheet Waterproofing as underlayment for the District's existing Clay Tile Roofing projects.

A. Related Sections

1. Division 1 Mockups

2. 07 60 00 Flashing and Sheet Metal
3. 08 63 00 Skylights

B. Submittals

1. Shop Drawings: Show tile layout, details of edge conditions, seams, joints, corners, and flashing.
2. Product Data: Include manufacturer's detailed material and system description, installation instructions, and finish specifications.
3. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this project, identifying the terms and conditions required of the Manufacturer and the Owner.
4. Qualification Data for Roofing Installer: Refer to Quality Assurance article below.
5. Material List

C. Quality Assurance

1. Installer Qualifications: Engage an Installer who has completed the Manufacturer's Approved Roofing Contractor course and is currently approved (within the last three years) for the installation of this roof system.
2. Installer shall submit work experience and evidence of adequate financial responsibility. The District Representative reserves the right to inspect fabrication facilities in determining qualifications.
3. Manufacturer shall provide the District with a written statement that they will provide a site inspection every day that confirms that the project is being constructed as specified, by an experienced, full time employee of the company.

D. Warranty

1. Owner shall receive one (1) warranty from manufacturer of roof panels covering all of the following criteria. Multiple warranties are unacceptable.
    a. Manufacturer's thirty (30) year no cost, non-pro-rated edge to edge warranty, including coverage for all trim, flashings, and penetrations.
    b. Twenty (20) year coverage on finish including checking, crazing, peeling, chalking, fading and/or adhesion.
    c. Warranty shall commence on date of substantial completion or final payment, whichever is agreed by contract.
    d. Installer shall provide manufacturer with five (5) year warranty covering roofing system installation and water tightness at no additional cost.
    e. One manufacturer shall provide a single warranty for underlayment, perimeter sheet metal flashings, sealants, and transitions between material types for edge to edge warranty.

Part 2 – Products

A. Acceptable Manufacturers:

1. The Garland Company http://www.garlandco.com/products/roll-goods/underlayments/hpr-aqua-shield.html
2. Or District Approved Equal

B. Sheet Material: Self-adhering, fiberglass reinforced, SBR modified base sheet
   1. Garland HPR Aqua Shield, or approved equal

C. Sealant: Heavy urethane caulk
   1. Garland Tuff Stuff, or approved equal

D. Mastic: Elastomeric, asphaltic mastic
   1. Garland Garla-Flex, or approved equal

E. Flashing and Sheet Metal: color coated, steel
   1. Coordinate with Section 07 60 00, to be provided by the same membrane manufacturer for Manufacturer's edge to edge warranty.

Part 3 – Execution

A. Installation
   1. Comply with all details and installation of roofing materials and flashings in accordance with approved shop drawings and manufacturer's product data, within specified erection tolerances.

B. Field Quality Control
   1. When the project is in progress, the roofing system manufacturer will provide the following:
      a. Keep the Architect and Owner informed as to the progress and quality of the work as observed.
      b. Provide daily job site inspections.
      c. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
      d. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

07 21 00 ROOFING INSULATION

Part 1 – General

A. Related Sections
   1. 07 92 00: Joint Sealants
   2. 07 50 00: Series, Roofing

3. 07 71 00: Roof Specialties

Part 2 – Products

A. Insulation

1. Polyisocyanurate with protection board.
2. R-Value to be determined by mechanical engineer based on calculations.
3. New: R-30 minimum, aged, average.
4. Re-Roofs: R-10 minimum, aged, average
5. Use two or more layers of rigid insulation set in adhesive to achieve R-rating.
6. Use tapered insulation, minimum 2-inch thickness at low point, only if roof framing is not sloped. Sloped framing is preferred.
7. Crickets to be polyisocyanurate, tapered insulation.
8. No Expanded Polystyrene (EPS)

B. Walk Pads: Recycled Rubber, must be compatible with roof material surface

Part 3 – Execution

No specific LBUSD requirements.

07 31 13 FIBERGLASS REINFORCED ASPHALT SHINGLES – DO NOT USE

07 41 63 METAL ROOFING

Part 1 – General

A. Section Includes:

1. Labor, equipment, and miscellaneous materials to install metal roof system over the properly prepared substrate
2. Pre-formed metal roof system
3. Roofing Waterproofing Underlayment
4. Flashing, trim, fasteners, and sealants as part of metal roofing system.

B. Related Sections

1. Division 1 Mockups
2. 08 63 00 Skylights

C. References

1. ASTM A792 - Specification for Steel Sheet, Aluminum - Zinc Alloy Coated by the Hot Dip Process, General Requirements

2. NRCA - National Roofing Contractors Association
3. UL Roofing Materials and Systems Directory Latest Edition

D. Submittals

1. Shop Drawings: Show actual panel layout, structural supports, details of edge conditions, seams, joints, corners, panel profiles, anchoring, and flashing. All shop drawings to be reviewed and "stamped" by a California Registered professional engineer.
2. Product Data: Include manufacturer's detailed material and system description, installation instructions, engineering performance and finish specifications. Indicate hat channel and fastener spacing.
3. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this project, identifying the terms and conditions required of the Manufacturer and the Owner.
4. Qualification Data for Roofing Installer: Refer to Quality Assurance article below.
5. Material List

E. Quality Assurance

1. Installer Qualifications: Engage an Installer who has completed the Manufacturer's Approved Roofing Contractor course and is currently approved (within the last three years) for the installation of this roof system.
2. Installer shall submit work experience and evidence of adequate financial Responsibility. The District Representative reserves the right to inspect fabrication facilities in determining qualifications.
3. Source Limitations: Obtain all components of roof system from a single manufacturer, including roll goods materials and perimeter flashing materials, coping metal edge and roll goods for flat roof sections for each project. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
    a. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
4. Manufacturer shall provide the District with a written statement that they will provide a site inspection every day that confirms that the project is being constructed as specified, by an experienced, full time employee of the company.

F. Delivery, Storage and Handling

Note to Design Professional: Require delivery, storage and handling per manufacturer's recommendations.

G. Warranty

1. Owner shall receive one (1) warranty from manufacturer of roof panels covering all of the following criteria. Multiple warranties are unacceptable.

a. Manufacturer's thirty (30) year no cost, non-pro-rated edge-to-edge warranty, including coverage for all trim, flashings, insulation, underlayment and penetrations associated with the standing seam roof area.

b. Twenty (20) year coverage on finish including checking, crazing, peeling, chalking, fading and/or adhesion.

c. Warranty shall commence on date of substantial completion or final payment, whichever is agreed by contract.

d. Installer shall provide manufacturer with five (5) year warranty covering roofing system installation and water tightness at no additional cost.

e. One manufacturer shall provide a single warranty for standing seam roof areas, membrane roof areas, and transitions between the two material types.

H. Design and Performance Criteria

1. Thermal Expansion and Contraction

a. Completed metal roofing and flashing system shall be capable of withstanding expansion and contradiction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

b. The design temperature differential shall be not less than 200° F.

c. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.

2. Uniform Positive Load Capacity

a. The installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf.

b. Capacity to resist positive loads shall be determined by empirical calculations in accordance with AISI. Calculation shall be sealed by a registered professional engineer.

3. Underwriters' Laboratories, Inc., wind uplift resistance classification: Roof assembly shall be classified as Class 1-90, as defined by UL 580.

4. Underwriters' Laboratories, Inc., Class A fire rating per UL 790.

5. ASTM E1680: Static pressure air infiltration (roof panels):

a. Pressure Leakage Rate:

b. 1.57 PSF 0.0012 cfm/sq. ft.

c. 6.24 PSF 0.0001 cfm/sq. ft.

d. 20.00 PSF 0.0011 cfm/sq. ft.

6. ASTM E1646: Static pressure water infiltration (roof panels):

a. Pressure Result

b. 5 Gal/Hr per S.F. and Static No Leakage

c. Pressure of 20.0 PSF for 15 minutes.

7. Capacities for guage, span, or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolation for conditions outside the test range is not acceptable.

Part 2 – Products

A. Acceptable Manufacturers:

1. The Garland Company http://www.garlandco.com/products/metal/standing-seam/r-mer-span.html
2. AEP Span http://www.aepspan.com/roof/index.html
3. Or District Approved Equal

B. Products, General

1. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria.

C. Standing Seam Metal Roofing System

1. Basis of Design: R-MER Span System by the Garland Company
   a. Panel material: 22 ga, Galvanized, per ASTM A792-96
   b. Flashing and flat stock material: Fabricate in profiles indicated on drawings of same material, thickness, and finish as roof system, unless indicated otherwise.
2. Exposed surfaces for coated panels:
   a. Two coat coil applied, baked-on full-strength fluorocarbon coating system (polyvinylidene fluoride, PVDF), applied by manufacturer's approved applicator.
      i. Coating system shall provide nominal 1.0 mil dry film thickness, consisting of primer and color coat.
3. Characteristics:
   a. Provide the same panel profile from a single manufacturer for all standing seam roof areas.
   b. Provide standing seam panels incorporating mechanically interlocked, concealed anchor clips allowing unlimited thermal movement, and of configuration which will prevent entrance or passage of water.
      i. Exposed fasteners, screws and/or roof mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at panel overlap (if required) and trim details (as per manufacturer's guidelines).

ii. Provide panels in continuous lengths from ridge to eave with no overlaps unless approved by manufacturer, in writing.

c. Seam must be two inches minimum height for added upward pressures and aesthetic appeal. Seam shall have continuous anchor reveals to allow anchor clips to resist positive and negative loading and allow unlimited expansion and contraction of panels due to thermal changes. Integral (not mechanically sealed) seams are unacceptable.

i. Concealed I-SPAN Anchors:

a. Anchor shall provide non-penetrating, concealed engagement at the panel seams in a manner similar to the standard anchor clips.

b. Sealant applied in panel cap must be isolated from anchor to ensure that no sealant damage occurs from the movement of the panel during expansion and contraction.

c. Anchor must maintain a clearance of a minimum of three-eighths (3/8) inches between panel and substrate for proper ventilation to help prevent condensation on underside of panel and eliminate the contact of panel fastener head to panel.

d. Stiffener: Located in flat of panel to minimize oil canning and telegraphing of structural members.

e. Replaceability: Panels shall be of a symmetrical design with snap on, mechanically seamed cap configuration such that individual panels may be removable for replacement without removing adjacent panels.

D. Accessories:

4. Coping Cap Sheet Metal: 22 gauge, galvanized, Kynar coated coping cap sheet metal. Install by breaking R-Mer SS Flat Stock per coping cap details. Flat stock to be 22 gauge, galvanized, Kynar coated, tested and certified to meet ANSI SPRI ES-1 Code requirement for wind uplift.

5. Trim Metal: Install all trim metal by breaking R-Mer SS Flat Stock per details. Flat stock to be 22 gauge, galvanized, Kynar coated, as specified.

E. Fasteners:

a. Concealed fasteners: Corrosion resistant steel fasteners (zinc plated or equal) designed to meet structural loading requirements. Provide #14 as minimum fastener size.

b. Exposed fasteners: Series 410 stainless steel fasteners or one-eighth (1/8) inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the standing seam panels.

c. Closures: Factory precut closed cell foam meeting ASTM D1056 or ASTM D3575, with metal trim matching panels when used at hip, ridge, jamb, and rake.

d. Provide all miscellaneous accessories for complete installation.

F. Sheet Metal Finish

1. Finish Coating: Kynar Coating.
    a. Energy Compliance: Energy Star compliant finish.
    b. Finish color: As indicated on the Drawings or as selected by Architect from the manufacturer's full range of colors, including metallic colors.

G. Membrane Waterproofing Underlayment

1. Underlayment shall be applied over entire roof area.
2. Underlayment shall be in accordance with manufacturer's recommendations.
3. Provide protective membrane/underlayment with "Class A" fire rating over deck surfaces.

Part 3 – Execution

A. Examination

1. Beginning of installation means acceptance of existing conditions.

B. Preparation

Note to Design Professional: Require preparation per manufacturer's recommendations.

1. Inspection: Examine the alignment and placement of the building structure and substrate. Correct any objectionable warp, waves or buckles in the substrate before proceeding with installation of the pre-formed metal roofing. The installed roof panels will follow the contour of the structure and may appear irregular if not corrected and may not be warrantable by the manufacturer.

C. Installation

1. Comply with all details and installation of roofing materials and flashings in accordance with approved shop drawings and manufacturer's product data, within specified erection tolerances.

D. Field Quality Control

1. When the project is in progress, the roofing system manufacturer will provide the following:
    a. Keep the Architect and Owner informed as to the progress and quality of the work as observed.
    b. Provide daily job site inspections.
    c. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
    d. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

07 60 00 FLASHING AND SHEET METAL

Part 1 – General

A. Related Sections

1. 05 50 00 Metal Fabrications
2. 07 50 00 Series, Roofing
3. 08 10 00 Series, Doors
4. 08 20 00 Series, Windows
5. 09 24 00 Cement Plaster and Metal Lath

B. Reference Standards

Note to Design Professional: Reference the latest editions of SMACNA and ANSI SPR1ES-1

C. Submittals

Note to Design Professional: Require shop drawings for each flashing detail.

Part 2 – Products

A. Material

1. Hot-dipped galvanized steel at steel components.
2. Aluminum at aluminum components such as storefront.
3. Stainless steel where dissimilar metals meet or in marine environments.
4. Galvanized steel minimum 22 gauge. Comparable thicknesses for other metals.
5. Penetration may be lead flashing

B. 18 gauge gutters with a minimum four inch profile with a 1-inch reveal at lip, 8-inch flange under roofing, 16 gauge bracket supports and strainers at downspouts. Install screens over gutters where trees are adjacent.

1. Downspouts in non-secure areas to be galvanized schedule 40 steel-pipe. (see 05 50 00)
2. Provide Kynar finish where color is required.

C. Attic vents, 20 gauge stainless steel.

D. Reglets, steel or aluminum as manufactured by Fry http://fryreglet.com, plastic not allowed.

E. Use appropriate pipe penetration flashing depending on roofing type.

F. .

Part 3 – Execution

A. Require gutters and downspouts to be water tested in presence of project inspector.

B. Use continuous cleats at copings.

C. Isolate dissimilar materials.

07 71 00 ROOF SPECIALTIES

Part 1 – General

A. Section Includes

1. Roof hatches
2. Smoke hatches

B. Related Sections

1. 07 92 00: Joint Sealants
2. 07 50 00: Series, Roofing

C. Submittals

1. Product Data: For each type of product indicated include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Shop Drawings: Show layouts of manufactured roof specialties, including plans and elevations. Identify factory- vs. field-assembled work. Include the following:
   a. Details for fastening, joining, supporting, and anchoring manufactured roof specialties including fasteners, clips, cleats, and attachments to adjoining work.
   b. Details for expansion and contraction.

Part 2 – Products

A. Manufacturers

1. Bilco http://www.bilco.com/home.asp
2. Milcor http://www.commercialproductsgroup.com/products/milcor.aspx
3. Or Approved Equal

B. Aluminum, 36-inch by 36-inch self-flashing curb with mill finish (minimum opening).

C. Hatches to have compression springs or gas loaded struts.

D. Covers to be rated to 40 PSF, lockable from inside, and insulated.

Note to Design Professional:

- Specify safety post for ladders.
- Specify rail guards three sides with chain on fourth side.

Part 3 – Execution

No specific LBUSD requirements.

07 92 00 JOINT SEALERS

Part 1 – General

Note to Design Professional: Specify fire rated sealants in 07 84 13 Penetration Firestopping.

A. Related Sections

1. 05 50 00: Metal Fabrications
2. 07 50 00: Series, Roofing
3. 07 84 13: Penetration Firestopping
4. 08 10 00: Series, Doors
5. 08 20 00: Series, Windows

B. Submittals

Note to Design Professional:

- Require color samples of each type of sealant to be used.
- Provide cut sheets of each sealant showing elasticity and durability.

C. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

1. Sika http://usa.sika.com/
2. BASF (Sonneborn) http://www.basfcc.com.sg/en/products/JointSealantsandJointSealingSystems/Pages/default.aspx
3. Pecora http://pecora.com/
4. Or Approved Equal

B. Silicone Sealant

1. Use at concrete, masonry and glazing applications.

C. Sanitary Sealants

1. One-part mildew-resistant silicone, formulated with fungicide for sealing interior joints of nonporous substrates around ceramic tile, plumbing fixtures, showers.

D. Single Component, Self-leveling, Polyurethane

1. Use at concrete joints.

E. Backer rods to be closed cell.

Part 3 – Execution

Note to Design Professional: Provide a sealant schedule at the end of the section.

A. Test for compatibility prior to start of work.

B. Prime joints.

C. Install with backer rods.

D. No joint to exceed 1-inch or manufacturer's suggested width, whichever is smaller.

DIVISION 8 – OPENINGS

08 11 13 HOLLOW METAL DOORS AND FRAMES

Part 1 – General

A. Related Sections

1. 05 50 00: Metal Fabrications
2. 07 92 00: Joint Sealants
3. 08 20 00: Series, Windows
4. 08 71 00: Door Hardware
5. 08 81 00: Glazing (for non-rated doors)
6. 09 22 16: Non-Structural Metal Framing
7. 09 24 00: Cement Plaster and Metal Lath
8. 09 29 00: Gypsum Board

B. Reference Standards

1. Fabricate and install per the Steel Door Institute (SDI) Guidelines http://www.steeldoor.org/

Part 2 – Products

A. Manufacturers

1. Curries Company; ASSA ABLOY https://www.curries.com/en/site/curries
2. Steelcraft; Allegion https://us.allegion.com/en/home.html
3. Or Approved Equal.

B. Doors

1. Seams to be continuously welded the full height of the door, ground smooth and filled to conceal the weld.
2. 12-Gauge Hinge Channel

3. 14-Gauge Closer Reinforcement Channel
4. 16-Gauge Top and Bottom End Channel
5. Stiffeners with Polystyrene Core
6. 14-Gauge Face Skins bonded to core

C. Doorframes

1. Frames to be 16-gauge.

D. All rated doors shall be factory glazed with a UL Label.

Part 3 – Execution

Note to Design Professional: Specify the factory baked-on enamel primer finish and coordinate field painting requirements for compatible touch-up primer and finish coats.

08 14 00 WOOD DOORS

Part 1 – General

A. Related Sections

1. 05 50 00: Metal Fabrications
2. 07 92 00: Joint Sealants
3. 08 50 00: Series, Windows
4. 08 71 00: Door Hardware
5. 08 81 00: Glazing
6. 09 24 00: Cement Plaster and Metal Lath
7. 09 29 00: Gypsum Board

B. Reference Standards

1. Fabricate and install per the Architectural Woodwork Institute (AWI) Guidelines https://www.awinet.org/home and Window and Door Manufacturers Association (WDMA) https://www.wdma.com/
2. Part 2 – Products

A. Manufacturers

1. Brentwood Manufacturing Company http://brentwoodmfg.com/default.asp
2. Masonite formerly Graham /ASSA ABLOY) https://architectural.masonite.com/contact/
3. Oregon Door http://oregondoor.com/
4. Or Approved Equal

B. Doors

1. 5-ply, solid core doors, do not substitute 7-ply.
2. Formaldehyde free
3. WDMA Extra Heavy Duty
4. Lumber core
5. Door thickness to be 1 ¾ inches, no exceptions.

C. Veneer: WDMA – Premium Grade

1. Stain Grade: Species: Red Oak, Birch, Maple or custom to match existing doors on campus.
2. WDMA "AA" Book and Running Match to meet AWI's requirements for "Premium grade".
3. Adhesive: Polyurethane Reactive (PUR)

D. Stain and Polyurethane Finish

1. Factory finish must meet or exceed WDMA TR-6 and AWI 1500 standards.

E. All rated doors shall be factory glazed with a UL Label.

Part 3 – Execution

No specific LBUSD requirements.

08 41 13 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Part 1 – General

Note to Design Professional: Glazing to be glass and specified in 08 8**0** 00 Glass Glazing.

A. Related Sections

1. 07 92 00: Joint Sealants
2. 08 20 00: Series, Windows
3. 08 71 00: Door Hardware
4. 08 81 00: Glazing
5. 09 24 00: Cement Plaster and Metal Lath
6. 09 29 00: Gypsum Board

B. Warranty

Note to Design Professional:

- Require manufacturer's warranty on window system, including glazing, and flashing.
- Require manufacturer's warranty on finish.

Part 2 – Products

Note to Design Professional:

- Provide structural performance and air and water penetration performance requirements.
- Specify thermally broken frame.
- Specify "inside set" or "inside glazed" system where top panes of glazing are 8 feet or above outside grade elevation, to allow for installation of glazing panels from the building's interior.

A. Acceptable Manufacturers

1. EFCO Corporation http://www.efcocorp.com
2. Kawneer Company http://www.kawneer.com/kawneer/north_america/en/product_category.asp?cat_id=1338
3. Arcadia http://www.arcadiainc.com
4. CRL (formerly U.S. Aluminum) http://www.crl-arch.com
5. Oldcastle Building Envelope (Vistawall) http://www.oldcastlebe.com/
6. YKK AP America http://www.ykkap.com/productmaster/
7. Or Approved Equal

B. Glazing, glazing gaskets, spacers and setting blocks, per manufacturer's requirements.

C. Finish Clear anodized aluminum, Aluminum Association A41, 0.7 mil.

D. Doors: Wide Stile Door

Part 3 – Execution

A. Field testing per AAMA 502-02 based on ASTM E 1105.

B. Perform test on mock-up or first portion installed in addition to final testing of 10 percent of all storefront.

C. Contractor to employ an independent testing company specializing in window testing. Test windows at 2/3 of manufacturer's design test pressure or 8 PSF whichever is greater.

08 51 13 ALUMINUM WINDOWS

Part 1 – General

A. Related Sections

1. 07 92 00: Joint Sealants
2. 08 20 00: Series, Windows
3. 08 81 00: Glazing
4. 09 24 00: Cement Plaster and Metal Lath
5. 09 29 00: Gypsum Board

B. Warranty

Note to Design Professional:

- For kitchen serving windows review manufacturers that comply with local health department requirements.
- Require manufacturer's warranty on window system, including glazing, flashing, and water tightness.
- Require manufacturer's warranty on finish.

Part 2 – Products

Note to Design Professional: Provide structural performance and air and water penetration performance requirements.

Glazing to be glass as specified in 08 80 00 Glass Glazing.

A. Acceptable Manufacturers
   1. Arcadia Architectural Products http://www.arcadiainc.com
   2. Oldcastle Building Envelope (Vistawall) http://www.oldcastlebe.com/
   3. Winco http://www.wincowindow.com
   4. Graham Architectural Products http://grahamwindows.com/
   5. Or Approved Equal

B. Glazing, glazing gaskets, spacers and setting blocks, per manufacturer's requirements.

C. Hardware
   1. Stainless steel hinges and latches. Windows to automatically lock when closed.
   2. Provide poles, wands, and other operating items such that latch is accessible.

D. Finish: Clear anodized aluminum, Aluminum Association A41, 0.7 mil.

Part 3 – Execution

A. Field testing per AAMA 502-02 based on ASTM E 1105.

B. Perform test on mock-up or first portion installed in addition to final testing of 10 percent of all windows or five windows, whichever is greater.
   1. If any one of the ten percent fail, additional testing shall be paid for by the contractor and a completely new set of windows will be re-tested.

C. The District is to employ an independent testing company specializing in window testing. Test windows at 2/3 of manufacturer's design test pressure or 8 PSF whichever is greater.

08 63 00 SKYLIGHTS

Part 1 – General

A. Related Sections

1. 07 50 00: Roofing Series
2. 07 60 00: Flashing and Sheet Metal
3. 07 92 00: Joint Sealants

B. Submittals

Note to Design Professional: Require samples of glazing.

1. Shop Drawings and Product Data: Submit detailed Shop Drawings and manufacturer's product data of the roof skylight, giving sizes, details of fabrication and construction, glazing data, coatings data, color chart, method of assembly, locations and types of anchors, and related work.

C. Pre-installation Meeting

1. Schedule a pre-installation meeting with Architect, Owner's Representative, and Contractor in attendance.

D. Warranty

Note to Design Professional: For pre-fabricated skylights, require that installation comply with the roofing manufacturer's warranty requirements and that the installation is warranted with the roof. Do not specify custom manufactured skylights.

Part 2 – Products

A. Manufacturers of Standard Skylight

1. Bristolite http://www.bristolite.com
2. Sunoptics http://sunoptics.com/
3. Or Approved Equal

B. Manufacturers of Tubular Skylights

1. Solatube http://www.daylightoc.com/
2. Natural Light http://www.natural-light-skylights.com/skylight-models/index.html
3. Or Approved Equal

C. Glazing

1. Use acrylic, fiberglass or other approved translucent glazing system. Glass is not allowed.
2. Domes to be dual or triple glazed.
3. Domes to be translucent. No clear domes.
4. Provide darkening mechanisms for classrooms.

D. Tubular Skylights

1. Specify light dampers and related electrical controls.
2. Acrylic impact-resistant dome.

3. Prismatic surface interior lens that eliminates hot spots.

Part 3 – Execution

No specific LBUSD requirements.

08 80 00 GLAZING

Part 1 – General

A. Related Sections

1. 07 92 00: Joint Sealants
2. 08 11 13: Hollow Metal Doors and Frames (for non-rated doors)
3. 08 14 00: Wood Doors (for non-rated doors)
4. 08 41 13: Aluminum Framed Entrances and Storefronts
5. 08 51 13: Aluminum Windows

B. Submittals

Note to Design Professional: Require samples of types of glass.

C. Extra Stock

Note to Design Professional: Verify with District Representative extra stock for the project is necessary prior to specifying.

1. Provide one pane of glass for each glass size on the project. See Design Guidelines for limitation on sizes.

D. Pre-Installation Meeting

1. Schedule a pre-installation meeting with Architect, Owner's Representative, and General Contractor in attendance.

E. Warranty:

Note to Design Professional: Require manufacturer's warranty on laminated glass units to remain laminated.

Part 2 – Products

Note to Design Professional:

- Specify 1" insulated glass consisting of ¼" laminated glass +½" air gap+1/4" laminated glazing. Window sash assemblies to be factory glazed with insulated glass units.
- Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum. Do not tint glazing; Low E coatings should remain as clear and non-reflective as possible.
- Specify hard coat Low-E glass. Low-E coating should be placed on at least one of the glass surfaces facing the air space.

A. The maximum U values, maximum solar heat gain coefficient, and minimum visible transmittance must meet the most current Building Energy Efficiency Standards Prescriptive Requirements of additions or alterations, unless the Performance based Title 24 calculations recommend more stringent values.

B. Glass:

1. 1/4-inch thickness, min for each pane of glass.
2. Roller Wave: 0.004 inch Average Peak to Valley Measurement (APVM), max.
   a. Provide documentation of glazing panels indicating APVM of glazing panels certified by manufacturer, to be submitted with delivery of glazing.

Part 3 – Execution

A. Training:

1. Provide two (2), two-hour training sessions on replacing glazing from each type of window frame. Training shall include removal and reinstallation of at least one pane.
2. Glazing to be installed from inside the building when the top of the panes are over eight feet above grade.

DIVISION 9 – FINISHES

09 24 23 CEMENT PLASTER AND METAL LATH

Part 1 – General

A. Related Sections:

1. 01 45 24: Environmental Import Materials Testing
2. 04 22 00: Concrete Unit Masonry
3. 06 10 00: Rough Carpentry
4. 07 60 00: Flashing and Sheet Metal
5. 07 92 00: Joint Sealants
6. 09 22 16: Non-Structural Metal Framing
7. 09 90 00: Painting

B. Reference Standards:

1. Plaster Information Bureau http://www.tsib.org/aboutus.shtml.
2. Related DSA IR.

C. Mock-ups:

1. Require a mock-up only if the texture is not a standard plaster texture or if the pattern is complex.

D. Submittals:

Note to Design Professional: Require a two-foot square sample of each texture to be used.

E. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Weather Barrier

1. Provide two layers of Type D, 30 pound organic felts, stagger seams.

B. Lath

1. Use 3.4 pounds per square foot, expanded metal lath. Chicken wire is not acceptable.

C. Plaster

1. Use three coat, scratch, brown, and finish over studs, 7/8-inch.
2. Use ½ thick, adhered brown and finish coat at CMU 1/2-inch.
3. Where stud wall plaster finish is required to align with CMU finish, use a three coat system with metal lath over the CMU.
4. In all cases, use integrally colored plaster.

D. Accessories

1. Use galvanized, standard plaster accessories.

Part 3 – Execution

A. Where plaster walls terminate at a floor or roof deck, provide a gap for deflection.

B. Where plaster transitions across different substrates, install a two-part expansion joint.

C. Install lath with furring nails.

D. Install weep screeds at base of walls.

09 29 00 GYPSUM BOARD

Part 1 – General

A. Related Sections

1. 03 30 00: Cast in Place Concrete
2. 06 61 00: Rough Carpentry

3. 09 22 16: Non-Structural Metal Framing
4. 09 30 13: Ceramic Tile

B. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

1. Georgia Pacific http://www.gp.com
2. National Gypsum http://www.nationalgypsum.com
3. United States Gypsum http://www.usg.com/index.html
4. Or Approved Equal

B. Products

1. All gypsum boards to be mildew and mold resistant, with a score of 10 on ASTM D3273.
2. Gypsum Board: 5/8-inch thick, Type X unless noted otherwise.
3. Non-sag Gypsum Board: 5/8 inch thick.
4. Shaft Wall Gypsum Board: where "H" studs are used, to be 1-inch thick on shaft side and 5/8-inch on opposite side.
5. Impact Resistant: standard gypsum with a fiber mesh embedded in the impact surface.
6. Water Resistant Gypsum Board:
   a. Gold Bond Hi-Abuse XP, by National Gypsum
   b. Gold Bond Hi-Impact, by National Gypsum
   c. Or approved equal
7. Cement based backer board per 09 30 00 Ceramic Tile.

Part 3 – Execution

Note to Design Professional:

- Require installation of the largest pieces possible.
- Require the use of screws for installation.
- New Construction: Drywall to be a Level 4 with orange peel finish.
- Renovation: Review existing finishes and indicate match existing. Advise and provide recommendations to District if existing finish does not match Level 4 with orange peel finish, or if there are a mix of finishes for District review.

09 30 00 TILE

Part 1 – General

A. Related Sections

1. 03 30 00: Cast-In-Place Concrete
2. 06 61 00: Rough Carpentry
3. 09 22 16: Non-Structural Metal Framing
4. 09 29 00: Gypsum Board

B. Reference Standards:

1. American National Standards Institute (ANSI).
2. Tile Council of North America (TCNA).
    a. Reference TCNA method numbers for tile assemblies.
3. Comply with Health Department requirements for tile in food service facilities.

C. Extra Stock

Note to Design Professional: Verify with District Representative extra stock for the project is necessary prior to specifying.

1. Provide minimum 2 percent of field tile and 5 percent of trims, shapes and accent tiles.

D. Warranty

Note to Design Professional: Require manufacturer's warranty on backer boards.

Part 2 – Products

A. Manufacturers

1. Dal Tile http://www.daltile.com/
2. Crossville http://www.crossvilleinc.com/
3. Or Approved Equal

B. Floors: Unglazed Porcelain Tile with through body color.

1. Size: 2-inches square.
2. Wall Base: 6-inch high cove base tile.
3. Tile Trims and Shapes: Select tile that has the required trim in matching colors.

C. Walls: Glazed Ceramic Tile to 7 feet high.

1. Size: 4 1/4-inches square.
2. Provide bullnose top edge trim.

3. Tile Trims and Shapes: Select tile that has the required trim in matching colors.

D. Grout:
   1. Floors: sanded 1/8 inch dark colored cementitious grout.
   2. Walls: sanded 1/8 inch light colored cementitious grout.
   3. Grout to be sealed by installer 3 days after installation.

E. Food Service: Quarry tile with 100 percent solids epoxy grout. Coordinate with local health department.

F. Tile Backing Board (walls only)
   1. Manufacturers:
      a. Georgia-Pacific Corp http://www.gp.com
      b. United States Gypsum http://www.usg.com/index.html
      c. Or approved equal
   2. Products:
      a. Cementitious backer board
      b. Dens-Shield Tile Backer
      c. USG Mold Tough
      d. USG Durock
   3. Provide tile backer board over water resistant gypsum board.

G. Threshold: Provide marble threshold, select from manufacturer's full color range.

Part 3 – Execution

Note to Design Professional:

- Show tile patterns on drawings if used.
- Floors: All first-floor tile applications to be mortar set.
- Comply with local health department.

A. Provide crack isolation and waterproofing membrane per recommendation of TCNA.

09 50 00 ACOUSTICAL PANEL CEILINGS

Part 1 – General

A. Related Sections
   1. 07 92 00: Joint Sealants

2. 09 22 16: Metal Framing

B. Extra Stock:

Note to Design Professional: Verify with District Representative extra stock for the project is necessary prior to specifying.

1. Provide no less than 5 percent of the number of tiles required for the Work.

C. Reference: Related DSA IR, Metal Suspension Systems for Lay-In Panel Ceilings.

D. Pre-Installation Meeting:

1. Schedule a pre-installation meeting with Architect, Owner's Representative, and General Contractor in attendance.

E. Warranty

Note to Design Professional: Require manufacturer's warranties against visible sag and mold, mildew, and bacterial growth on panels.

Part 2 – Products

A. Manufacturer:

1. Armstrong World Industries, Inc.: http://www.armstrong.com/commceilingsna/
2. United States Gypsum: http://www.usg.com/ceilings/acoustical-suspension-systems.html
3. CertainTeed: http://www.certainteed.com/ceilings
4. Or Approved Equal

B. Ceiling Tile

1. Standard: Two-foot by four-foot, 5/8 inch minimum, lay-in, acoustical mineral fiber ceiling panels. NRC Range 0.70, STC Range 30 to 34, white, fissured finish (recycled content product).
   a. Armstrong: School Zone Fine Fissured square lay-in.
   b. USG: Radar, ClimaPlus, Education High-NRC/High-CAC
   c. CertainTeed: Performa Fine Fissured High-NRC
2. Kitchens: Two-foot by four-foot, 5/8 inch minimum, lay-in acoustical tile with washable white vinyl facing.
   a. Armstrong: Clean Room VL
   b. USG: Sheetrock Brand Lay-in Ceiling Panel Climaplus, Vinyl
   c. Or Approved equal
3. Auditoriums:
   a. Armstrong: Invisacoustics, Optima Capz or Optima Vector
   b. Or Approved equal

4. 12” x 12”
    a. CertainTeed: Ecophon Focus F
    b. USG: Radar, Climaplus Tile (SF Edge)
    c. Or Approved equal

Note to Design Professional:

When replacing existing glue-up ceiling tiles, in addition to any adhesive required, they may also need to be mechanically fastened, such as at existing corridor ceilings or auditoriums.

C. Grid System
    1. Exposed Tee System, heavy-duty, 24-inch by 48-inch grid, flat white, baked enamel finish.
        a. Armstrong: Prelude XL 15/16 inch Exposed Tee
        b. USG: Donn DX HD 15/16 inch Exposed Tee
        c. Or Approved equal

Part 3 – Execution

A. Grid to be installed per related DSA IR.

09 64 53 RESILIENT WOOD FLOORING ASSEMBLIES

Part 1 – General

A. Related Sections:
    1. 03 30 00: Cast in Place Concrete
    2. 06 10 00: Rough Carpentry
    3. 09 65 00: Series, Flooring

B. Pre-Installation Meeting
    1. Schedule a pre-installation meeting with Architect, Owner’s Representative, and Contractor in attendance.

C. Delivery, Storage, and Handling
    1. Flooring components shall be acclimatized, within the space, for three weeks.
    2. Building shall be enclosed prior to delivering floor components.

D. Warranty

Note to Design Professional: Require manufacturer’s warranties on installation against cupping, buckling and warping and on finish and striping.

Part 2 – Products

Note to Design Professional: Do not specify proprietary systems; allow competitive bidding by listed manufacturers, but base performance characteristics for Connor system as indicated below.

A. Manufacturers
   1. Connor Sports Flooring http://www.connorfloor.com
   2. Robbins Sports Surfaces http://www.robbinsfloor.com
   3. Action Floor Systems http://www.sportsfloors.org/action.html
   4. Or Approved Equal

B. Floating Plywood Panel System - Connor "Neo-Shok" or approved equal
   1. Vapor Barrier: 6-mil polyethylene
   2. Resilient Neo-Shok Pads:
      a. Gyms: ¾ inch thick, hemispherical, two-stage, Red-70D durometer
      b. Dance: Black-50D
   3. Subfloor: 2-layers of 15/32 inch APA, exposure 1, rated plywood sheathing.
   4. Flooring (Connor Laytite Maple)
      a. Second or better, Northern Hard Maple Flooring, TGEM, MFMA Grade marked and stamped as manufactured by Connor Sports Flooring.
      b. 33/32-inch thick by 2 ¼ inch wide
      c. 1/64 inch side edge crush bead
      d. SMARTWOOD certified as harvested from managed forests.
   5. Fasteners
      a. Flooring: 2-inch barbed cleats
      b. Subfloor: 1-inch staples
   6. Seal: Water based wood seal
      a. Basis of Design: Star Seal, by Hillyard.
   7. Finish: Epoxy based formula
      a. Basis of Design: Contender Finish, by Hillyard.
   8. Game Lines
      a. Game line paint must be compatible with floor finish.
   9. Wall Base
      a. Manufacturer 3-inch x 4-inch heavy duty, molded, vented cove base with pre-manufactured outside corners.

C. Stage Floors

1. ¾ inch C-D plywood
2. ½ Masonite, painted flat black.
3. Ring-shank nails to fasten members.

Part 3 – Execution

Note to Design Professional:

- Specify installation instructions in conformance with manufacturer recommendations.
- Provide transition thresholds where floors end at doors, lobby etcetera.
- Specify a minimum of two coats of polyurethane over striping on prefinished boards.

09 65 00 RESILIENT FLOORING

Part 1 – General

A. Related Sections

1. 03 30 00: Cast in Place Concrete
2. 06 10 00: Rough Carpentry

B. Submittals

Note to Design Professional: Require shop drawings when patterns are specified on the drawings.

1. Provide a sample of each color specified.

C. Pre-Installation Meeting

1. Schedule a pre-installation meeting with Architect, Owner's Representative, Contractor, and Manufacturer Representative in attendance.

D. Extra Stock

Note to Design Professional: Verify with District Representative extra stock for the project is necessary prior to specifying.

1. Specify a minimum of 40 square feet of flooring and transition pieces of each material and color specified or 2 percent whichever is greater.

E. Preconstruction Testing:

Note to Design Professional: Confirm required testing of concrete subfloor. Tests must conform to the manufacturer's requirements for installing the flooring.

F. Warranty

Note to Design Professional: Require manufacturer's 15-year warranty.

Part 2 – Products

A. Manufacturers

1. Forbo http://www.forbo-flooring.com
2. Johnsonite https://commercial.tarkett.com/en_US/
3. Gerflor https://www.gerflorusa.com/
4. Or Approved Equal.

B. Linoleum Flooring: 6.5-foot width; 0.1 inch (2.5mm) thick; self-coving 4-inch base. Specify color from Manufacturer's standard range with fully welded seams. Confirm manufacturer's recommended seaming requirements.

C. Flooring Adhesive (Moisture Resistant)

1. Forbo, Sustain 100
2. Or Approved Equal

Note to Design Professional: Must comply with the following minimum moisture resistant requirements: 10 lbs. per 1,000 square feet in 24 hours when tested in accordance with the latest version of ASTM F 1869, and 100% RH when tested with the latest version of ASTM F 2170

D. Accessories:

1. Cove accessories: backing, caps, sticks, or edge as needed

Part 3 – Execution

Note to Design Professional: Require coved bases and cove backing.

A. Convention seams, heat-welding may not be required. Refer to manufacturer's recommendations.

B. Bond Test 3' x 3' patch to confirm adhesion prior to installation

C. Tests: RH (typically can go up to 12) or RH (typically can go up to 100). Confirm with manufacturers,

D. Floor must be flat, smooth and free of contaminants

09 65 13 RUBBER BASE

Part 1 – General

A. Related Sections

1. 03 30 00: Cast in Place Concrete
2. 06 10 00: Rough Carpentry
3. 09 29 00: Gypsum Board
4. 09 65 00: Series, Flooring

B. Extra Stock

Note to Design Professional: Verify with District Representative extra stock for the project is necessary prior to specifying.

1. Provide an additional 20-foot of each color and type of base.

Part 2 – Products

A. Manufacturers

1. Burke by Mannington https://www.manningtoncommercial.com/products/collections/burkebase/
2. Johnsonite http://www.johnsonite.com
3. Roppe Rubber Corporation http://www.roppe.com
4. Or Approved Equal

B. Roll product

C. Size: 4-inches high.

D. Accessories: Provide rubber reducer strips, carpet edge, transition strips, and pre-formed inside and outside corners.

Part 3 – Execution

Note to Design Professional: Specify cove toe at carpet and resilient floors.

A. Use pre-formed molded shapes at inside and outside corners.

B. Minimize seams by using full length material.

09 65 66 INDOOR RESILIENT ATHLETIC SURFACING

Note to Design Professional:

- Interlocking rubber tile flooring will be provided in weight room and similar spaces.
- Review existing flooring for moisture issues or other concerns in existing slabs

Part 1 – General

A. Submittals

1. Product Data: Submit brochures, specifications, and installation instructions.
2. Manufacturer Certifications:
   a. Provide certification that accurately identifies the Original Equipment Manufacturer (OEM) of flooring furnished for this project including manufacturer's name, address, and factory location. Suppliers of private label

flooring must identify themselves as such and fully disclose the OEM information listed above.

b. Installer to submit the indoor resilient athletic surfacing manufacturer's certification attesting that they are an approved installer of the indoor resilient multipurpose surfacing.

3. Samples: Submit samples from all standard colors, textures, and styles available. Include color samples of all available game line paint colors for selection and approval.

B. Quality Assurance

1. The indoor resilient multipurpose surfacing shall have been actively marketed for a minimum of ten (10) years.
2. The indoor resilient multipurpose surfacing shall be manufactured in an ISO 9001 and ISO 14001 certified plant.
3. The installer of the indoor resilient multipurpose surfacing shall have a minimum of five (5) years of experience in the field installing indoor resilient multipurpose surfacing and have worked on at least five (5) projects of similar size, type, and complexity.

C. Project and Site Conditions

1. Verify and maintain proper concrete subfloor pH level and slope requirements, space containment, completion status, and ventilation, and other conditions necessary for installation per Manufacturer's instructions.

D. Warranty

Note to Design Professional: Require manufacturers standard Warranty.

Part 2 – Products

A. Manufacturer – Weight Rooms – Rubber Flooring

1. **Middle Schools** - "Triumph" line by Tarkett or District Approved Equal that covers the entire surface of the floor, and glued to the underlayment flooring.
2. **High schools:** Tarkett drop-tiles or District Approved Equal floated on the floor, edge to edge and have reducers to be used at door thresholds, sealed concrete would be sufficient under the tiles.

B. Manufacturer

1. Fieldturf Omnisports
2. Or Approved Equal

C. Materials

1. Sheet Roll: Prefabricated sport surface with intermediate layers fortified by non-woven fiberglass grid. Foam force reduction layer shall be high density closed cell PVC foam with honeycomb embossing, applied in one continuous process. Laminated or adhered foam layers will not be allowed.

2. Multi-Poxy moisture mitigation/adhesive combination: Provide non-solvent reactive topically applied moisture mitigation/adhesive according to manufacturer's recommendations.
3. Finish:
    a. Wood flooring design and slightly textured embossed surface.
    b. Clear layer of pure PVC and Top Clean factory applied UV cured urethane treatment.
4. Width: 6 feet and 6 inches
5. Length: 85 feet max.
6. Total Thickness

    Note to Design Professional: Specify a sheet roll thickness of 6.5 mm, 5.0 mm, or 3.5 mm based on application.
7. Vertical Deformation and Surface Finish Effect: Passes ASTM F2772
8. Rolling Load: 0.22 per EN 1569

    Note to Design Professional: Update rolling load per thickness of material selected.
9. Abrasion Resistance: 0.13 per EN ISO 5470-1

    Note to Design Professional: Update abrasion resistance per thickness of material selected.
10. Sound Insulation: 19 dB per ISO 717/2, In Room: 61 dB per NF S31-074

    Note to Design Professional: Update sound insulation per thickness of material selected.
11. Ball Rebound: 90% min. per ASTM F2772
12. Shock Absorption: Class 1 per ASTM F2772

    Note to Design Professional: Update shock absorption per thickness of material selected.
13. Fire Rating: Class 1 per ASTM E648
14. Welding Rod: As supplied by indoor resilient athletic surfacing manufacturer. All seams shall be welded to create a monolithic and impermeable surface.
15. Paint and Primer: As approved by indoor resilient athletic surfacing manufacturer.

    Note to Design Professional: Specify adhesive, if applicable, based on material selected, to be as approved by the indoor resilient athletic surfacing manufacturer.

Part 3 – Execution

A. Install per manufacturer's recommendations.

09 68 13 CARPET TILE

Part 1 – General

A. Related Sections

1. 03 30 00: Cast in Place Concrete
2. 06 10 00: Rough Carpentry

B. Submittals

a. Product Specifications

b. Specification for Adhesive

c. Shop Drawing, including location of seams and locations and types of carpet transitions and accessories

d. Samples – Provide a sample of each color specified

e. Schedule

f. Qualification for Installer

C. Pre-Installation Meeting

2. Schedule a pre-installation meeting with Architect, Owner's Representative, Contractor, and Manufacturer's Representative in attendance.

D. Extra Stock

Note to Design Professional: Verify with District Representative if extra stock for the project is necessary prior to specifying.

E. Preconstruction Testing:

Note to Design Professional: Confirm required testing of concrete subfloor. Tests must conform to the manufacturer's requirements for installing the flooring.

F. Warranty

Note to Design Professional: Require a minimum of 15 years manufacturer's warranty.

Part 2 – Products

A. Carpet Tile

a. 24" x 24"

b. Educational Rated

i. Must be Commercially Rated (no residential or light commercial products)

ii. Carpet Tile must have a TARR rating of heavy or greater

c. Walk-Off Tile must have a TARR rating of severe and be neutral color (patterns for walk-off are discouraged)

d. Backing Options:
    i. Tile Backing that meet or exceeds 99% RH and 12 pH.

e. High Stain Resistance or Stain Blocker
f. Warranty must be a minimum of 15 years by manufacturer
g. Coordinate Backing with Carpet Tile Backing Selection

B. Manufacturers
1. Bentley
    a. www.bentleymills.com
    b. Coin Op II, High Score II, Multiplay II
    c. Drumline Pagentry
    d. Tile Backing Options
        i. Luxefelt Cushion – moisture guard plus cushion
    e. Walk-Off Tile
        i. Rough Idea Shear - moisture guard plus cushion
2. Mannington Commercial
    a. https://www.manningtoncommercial.com/products/carpet/modular/
    b. Exchange II Collection
    c. Quadrant Collection
    d. Tile Backing Options
        i. Infinity 2 MG – moisture guard plus cushion
    e. Walk-Off Tile
        i. Liaison Entryway Collection 24” x 24” - moisture guard plus cushion
3. Shaw Contract
    a. shawcontract.com
    b. Diffuse Color + Disperse Color
    c. Diffuse Disperse
    d. Tile Backing
        i. EcoLogix – moisture guard plus cushion
    e. Walk-Off Tile
        i. All Access

1. Path or Portal 24” x 24” Tile
    a. Add EcoLogix Backing

4. Or Approved Equal

C. Flooring Adhesive
    a. Moisture Resistant
    b. Coordinate Adhesive with Manufacturer to comply with flooring system for full warranty.

D. Accessories
    1. Coordinate accessories including base and transition strips. Preference is to limit transitions strips, coordinate products including backing whenever possible to limit need for transitions or reducers.

Part 3 – Execution

Note to Design Professional: Review existing site conditions and manufacturer’s installation instructions for maximum allowed moisture readings per backing type and adhesive. Testing may include, but is not limited to, RH (in-situ relative humidity test), PH, and Calcium Chloride. Confirm required testing for full warranty of entire flooring system. Depending on adhesive and backing types, testing may not be required.

Note to Design Professional: Require coved bases and cove backing.

A. Closeout Submittals
    a. Maintenance Instruction
    b. Warranty Documents
    c. Training
        i. Provide one 2-hour on-site Manufacturer provided training on care and maintenance to District Operations and Maintenance Departments per Project.

B. Flooring must be flat, smooth, and free of contaminants. Confirm mechanical versus chemical removal and associated approved methods required to meet manufacturers requirements.

09 90 00 PAINTING

Note to Design Professional: Specify in bid documents the pre-selected color schedule from District standard colors per FDS Volume 1 Design Standards.

Part 1 – General

A. Related Sections
    1. 03 30 00: Cast in Place Concrete

2. 04 22 00: Concrete Unit Masonry
3. 05 50 00: Metal Fabrications
4. 08 10 00: Series, Doors
5. 08 50 00: Series, Windows
6. 09 24 23: Cement Plaster and Metal Lath
7. 09 29 00: Gypsum Board
8. 09 96 23: Graffiti-Resistant Coatings

B. Submittals

Note to Design Professional:

- Require paint drawn down card with manufacturer, product information, and formula for all colors and sheens proposed for use on project.
- Require Contractor to submit final schedule of colors with formulas for each paint color and sheen at project closeout including manufacturer information and product line.

1. Installer Certifications – Submit documentation that all Contractors which will impact surfaces coated with lead-based paints (coatings containing lead at 1.0 mg/cm, or greater, if tested by XRF, or 5,000 mg/kg, or greater, if tested by paint chip samples), hold a current Lead Safe Work certification, as required by 40 CFR 745.

C. Extra Stock

Note to Design Professional: Verify with District Representative extra stock for the project is necessary prior to specifying.

1. One gallon of each color used, clearly marked with manufacturer label and mix design (formula).

Part 2 – Products

Note to Design Professional:

- Specify only low or no VOC paints and primers in compliance with requirements per CAL-EPA.
- Specify only the highest quality, commercial paints as manufactured by the following:

A. Manufacturer

1. Dunn Edwards http://www.dunnedwards.com/
2. Sherwin Williams http://www.sherwin-williams.com/
3. Vista Paint: www.vistapaint.com
4. Or Approved Equal

B. Good flow and brushing properties capable of drying or curing free of streaks, sags, and voids.

C. Accessory Materials: All other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

D. Finishes:

1. Refer to drawings for finish schedule.
2. Product numbers listed are as manufactured by Dunn Edwards unless indicated otherwise (equivalent products of other manufacturers listed hereinbefore are also acceptable).

E. Schedule - Exterior Surfaces - Descriptions in schedule apply to new and previously painted surfaces. Number of coats listed is a minimum, additional coats may be required to achieve full and complete coverage.

1. Ferrous Metal (Semi-Gloss Enamel) Completely re-prime all shop primed items in field

   1st coat – Dunn-Edwards Bloc-Rust Primer BRPR00-1 Series

   2nd and 3rd coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

2. Metal Deck (underside) and Supporting Structural Steel Members

   1st coat – Dunn-Edwards Bloc-Rust Primer BRPR00-1 Series

   2nd and 3rd coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

3. Galvanized Metal Railings (Gloss Urethane Enamel) <Only when previously painted>

   1st coat – Metal Clean and Etch SCME-01

   2nd coat – Dunn-Edwards Ultragrip Multisurface Primer UGPR00

   3rd and 4th coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

4. Galvanized Metal Non-Railings (Misc. Galvanized metals, underside of metal decking, flashings, etc.) (Semi-Gloss Enamel)

   1st coat – Metal Clean and Etch SCME-01

   2nd coat – Dunn-Edwards Ultragrip Multisurface Primer UGPR00

   3rd and 4th coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

5. Cement Plaster and Exposed Concrete (Semi-Gloss)

   1st coat – Dunn-Edwards Eff-Stop Select ESSL00

   2nd and 3rd – Dunn-Edwards Evershield EVSH50 Semi-Gloss

6. Wood (Semi-gloss)

   1st coat - Dunn-Edwards E-Z Prime Premium EZPR00

   2nd and 3rd coats - Dunn-Edwards Evershield EVSH50 Semi-Gloss

7. New Concrete Block (Semi-Gloss)

   1st coat - Dunn-Edwards Blocfil Select SBSL00

   2nd and 3rd coats - Dunn-Edwards Evershield EVSH50 Semi-Gloss

8. Existing Concrete Block (Semi-Gloss)

   1st coat – Dunn-Edwards Eff-Stop Select ESSL00

   2nd and 3rd coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

9. Aluminum In-Fill Panels (Submit Variance Request, only consideration if previously painted)

   1st coat – Factory Prime coat (Touch up if abraded)

   2nd and 3rd coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

10. Cementitious Siding (Semi-Gloss)

    1st coat – Dunn-Edwards Eff-Stop Select ESSL00

    2nd and 3rd coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

F. Schedule - Interior Surfaces - Descriptions in schedule apply to new and previously painted surfaces. Number of coats listed is a minimum, additional coats may be required to achieve full and complete coverage.

1. New Gypsum Board (Semi-Gloss at Walls, Gloss at Kitchen and Restroom Ceilings, and Flat at other Ceilings, Enamel)

   1st and 2nd coats - Dunn-Edwards Vinylastic Select VNSL00

   3rd and 4th coats - Dunn-Edwards Evershield EVSH50 Semi-Gloss (for walls) Dunn-Edwards Evershield EVSH60 (for gloss ceilings), Vista Paints, Duraglide 1000, Flat, White (for flat ceilings)

   Note to Design Professional: (Typical paint system at classrooms, offices, administration, and storage rooms.)

2. Existing Gypsum Board (Semi-Gloss at Walls, Gloss at Kitchen and Restroom Ceilings, and Flat at Ceilings, Enamel)

   1st coat - Dunn-Edwards Interkote Premium IKPR00 or B-I-N Primer-Sealer Stain-Killer if necessary.

   2nd and 3rd coats - Dunn-Edwards Evershield EVSH50 Semi-Gloss (for walls) Dunn-Edwards Evershield EVSH60 (for gloss ceilings) Dunn-Edwards Spartawall Flat SWLL10 (for flat ceilings)

   Note to Design Professional: (Typical paint system at classrooms, offices, administration, and storage rooms.)

3. New or Existing Painted Wood (Semi-Gloss Enamel)

   1st coat - Dunn-Edwards Interkote Premium IKPR00 or B-I-N Primer-Sealer Stain-Killer if necessary.

   2nd and 3rd coats - Dunn-Edwards Evershield EVSH50 Semi-Gloss

4. New Wood to Receive Transparent Finish (Stain and Lacquer)

   1st coat – Dunn Edwards Valpro Sanding Sealer NAS 2750

2nd and 3rd coats - Dunn Edwards Valpro Satin Lacquer NAF 2752

5. Existing Stained Wood (Varnish Finish)

   1st coat – Minwax Stain

   2nd and 3rd coats – Defthane Polyurethane Satin Varnish

6. Existing Stained Wood (Lacquer Finish)

   1st coat – Stain to provide uniform finish, match existing tone Valspar Zenith Stain

   2nd and 3rd coats - Dunn Edwards Valpro Satin Lacquer NAF 2752

7. Ferrous Metal (Semi-Gloss Enamel) – Re-prime all shop primed items in field.

   1st coat – Dunn-Edwards BLOC-Rust Premium BRPR00-1 series

   2nd and 3rd coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

   (Typical paint system at all hollow metal doors and frames)

8. Cement Plaster and Exposed Concrete (Semi-Gloss at Walls, Gloss at Kitchen and Restroom Ceilings, and Flat at Ceilings, Enamel)

   1st coat – Dunn-Edwards Ultra Grip Premium UGPR00 series or B-I-N Primer-Sealer Stain-Killer if necessary

   2nd and 3rd coats- Dunn-Edwards Evershield EVSH50 Semi-Gloss (for walls) Dunn-Edwards Evershield EVSH60 (for gloss ceilings) Dunn-Edwards Spartawall Flat SWLL10 (for flat ceilings)

9. Acoustical Ceiling Tiles (Flat)

   1st coat – Dunn-Edwards Ultra Grip Premium UGPR00 series or B-I-N Primer-Sealer Stain-Killer.

   2nd and 3rd coats - Dunn-Edwards Acoustikote W615

10. Galvanized and Zinc Alloy Metal, (Semi-Gloss Enamel).

    1st coat – Metal Clean and Etch SCME-01

    2nd coat - Dunn-Edwards Ultra Grip Premium UGPR00 series

    3rd and 4th coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

11. Concrete Block (Semi-Gloss)

    1st coat – Dunn-Edwards Blocfil Select SBSL00

    2nd and 3rd coats – Dunn-Edwards Evershield EVSH50 Semi-Gloss

Part 3 – Execution

A. Do not paint over existing transparent finishes. Existing transparent finishes shall be refinished to match existing. Specify finish compatible with existing.

B. Protect planting adjacent to buildings. Remove protection of plants daily.

C. All shop-primed items are to be fully re-primed in the field.

D. Acid wash all galvanized materials. Etch and prime prior to finish painting and rinse thoroughly.

E. All existing surfaces to be repaired and prepared prior to painting.

F. Interior surface preparation of existing walls to include TSP cleaning, sanding and patching of all interior surfaces.

G. Ensure all surface repair activities, paint preparation activities, or other activities which abrade, scratch, or otherwise cause physical damage to painted surfaces, are performed in compliance with 8 CCR 1532.1 (Cal/OSHA Lead in Construction Standard).

H. Color-tint sealers and undercoats within general color range of finish color. Vary color of successive coats sufficiently to distinguish between coats.

I. Three coat system over existing paint or new primed finishes to consist of one prime coat and two finish coats.

J. Sand lightly between coats of paint.

K. Interior Surfaces

1. Wood to be semi-gloss painted, or stained, polyurethane clear finish, for decorative wood doors and casework.
2. Doors and frames to be one color, gloss enamel paint.

09 96 23 GRAFFITI-RESISTANT COATINGS

Part 1 – General

A. Related Sections

1. 03 30 00: Cast in Place Concrete
2. 04 22 00: Concrete Unit Masonry
3. 05 50 00: Metal Fabrications
4. 08 10 00: Series, Doors
5. 08 50 00: Series, Windows
6. 09 24 23: Cement Plaster and Metal Lath
7. 09 29 00: Gypsum Board

B. Comply with VOC requirements per CAL-EPA.

Part 2 – Products

A. Manufacturer

1. RainguardPro

2. Monochem
3. Or Approved Equal

B. Non-sacrificial Anti-Graffiti Coating:
   1. Basis of Design: VandlGuard Ten from RainguardPro
   2. Permashield Premium from Monochem

C. VOC compliant.

D. Application as specified by manufacturer.

Part 3 – Execution

A. Surface preparation per SSPC Society for Protective Coatings, Surface Preparation Standards (SSPC-SP).

B. Install on surfaces under eight feet. Continue coating to logical break such as a control joint of top of wall over eight feet.

C. Verify compatibility with block and concrete sealer or other primers.

DIVISION 10 – SPECIALTIES

10 11 16 MARKER BOARDS

Part 1 – General

A. Related Sections
   1. 03 30 00: Cast in Place Concrete
   2. 04 22 00: Concrete Unit Masonry
   3. 06 10 00: Rough Carpentry
   4. 06 40 00: Architectural Woodwork
   5. 09 29 00: Gypsum Board

B. Warranty

Note to Design Professional: Require manufacturer's "Life of Building" Warranty.

Part 2 – Products

A. Manufacturers
   1. Claridge http://www.claridgeproducts.com/
   2. Platinum Visual Systems https://pvsusa.com/

3. ADP Lemco https://adplemco.com/
4. Nelson Adams NACO https://nelsonadamsnaco.com/
5. Or Approved Equal

B. Marker Boards

1. Basis of Design: Series 8 for Education, LCS Porcelain 100 White
2. Aluminum framed
3. Porcelain enamel over steel
4. Magnetic
5. Accessories: standard continuous 2-inch-high map rail (separate from marker board); map hooks: one every two feet, 2-inch display rail, marker tray, flag holder. Adjust as needed to accomodate ceiling and wall space.
6. Low gloss white finish.
7. Refer to Classroom Sample Layouts, see Volume 4.

Note to Design Professional: Sample to be approved by District Representative prior to procurement.

Part 3 – Execution

A. No plastic anchors allowed.

B. If boards cannot be a single unit, locate seam as far from center of unit as possible.

C. Provide continuous backing at top and bottom of boards.

10 11 23 TACK BOARDS

Part 1 – General

A. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturer

1. Koroseal http://koroseal.com/
2. Or Approved Equal

B. Aluminum framed, integral with marker boards where adjacent.

C. Vinyl Fabric on ½ inch fiberboard.

D. Self-healing, vinyl surface covering, weighing not less than 21 ounces per lineal yard and flame-retardant.

Part 3 – Execution

A. No plastic anchors allowed.

B. If boards cannot be a single unit, locate seam as far from center of unit as possible.

C. Provide continuous backing at top and bottom of boards.

10 14 00 SIGNAGE

Part 1 – General

Note to Design Professional:

- Include a signage schedule in accordance with accessibility requirements.
- Room and building designations need to be approved by designated District Representative. Refer to Volume 3 for Room Naming Conventions.
- Conforming to ASTM D4802; non-glare (matte), UV stable, suitable for interior and exterior use
- Select Colors from Manufacturer's Standard Color Line

A. Related Sections

1. 06 10 00: Rough Carpentry
2. 08 10 00: Series, Doors
3. 09 22 16: Metal Framing
4. 09 24 23: Cement Plaster and Metal Lath
5. 09 29 00: Gypsum Board
6. 09 30 13: Ceramic Tiling
7. 10 28 13: Restroom Accessories

B. Submittals

1. Shop Drawings: Require diagrams of each type and size of sign.
2. Submit a sign sample for each sign type and size

C. Warranty:

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers
   1. Toji https://www.4adasigns.com/
   2. ASI http://asisignage.com
   3. Gemini http://www.geminisigns.com
   4. Vomar Products http://vomarproducts.com
   5. Mohawk Sign Systems http://mohawksign.com
   6. Western Highway Products http://www.westernhighway.com/
   7. A Good Sign http://www.agoodsign.com
   8. Or Approved Equal

B. Exterior signs mounted on posts or walls to be 0.080 inch aluminum panel
   1. Finish:
      a. Parking Lot Signage: reflectorized, code-compliant, heavy-duty vinyl or similar sheeting
      b. Other Site Locations: baked enamel finish
   2. Mounted to galvanized steel post set in 36-inch by 12-inch, 2500 PSI concrete footing.
   3. Obtain tow away phone numbers from District.

C. Room identification and other interior signage to be ¼-inch acrylic with integral color and fused raised lettering complying with California Braille. See Appendix 'E' in Volume 1 of the Facility Design Standards.

D. Architectural Lettering to be aluminum font, color, stroke and size determined by design. The minimum letter height shall comply with local jurisdiction's requirements and consider the number of building floors and building height Colors must be anodized and coordinated with exterior building finishes; no paint or other coating is acceptable. Avoid clear anodized lettering or numbering. Wall mounted letters to be post-mounted off the wall surface.

   Note to Design Professional: Bronze dedication plaques will be provided as OFOI on new schools and renovations of entire campuses, however backing is to be provided in the wall as CFCI. Coordinate with District for location and size.

Part 3 – Execution

A. All signage to be mechanically fastened with tamper proof screws and anchors.

B. Keep architectural lettering out of the reach of students.

10 14 63 ELECTRONIC MESSAGE DISPLAY (FOR MARQUEES)

Part 1 – General

A. Related Sections

1. 03 20 00: Concrete Reinforcement
2. 03 30 00: Cast in Place Concrete
3. 05 12 00: Structural Steel Framing
4. 26 00 00: Electrical Sections
5. 27 00 00: Low Voltage Sections

B. Warranty

Note to Design Professional: Require manufacturer's warranty.

1. Minimum two years with software updates included during warranty period.

Part 2 – Products

A. Manufacturers

1. Vantage LED USD http://vantageled.com/
2. Stewart Signs http://www.stewartsigns.com/
3. National Sign and Marketing http://www.nsmc.com/
4. Or Approved Equal

B. Signs

1. Display: Full color LED display between 16 – 20 mm.
2. Display should be capable of displaying, as a minimum:
    a. Four lines of 5.5-inch text, 21 characters wide.
    b. Graphics either by themselves or in conjunction with text.
3. Finish: Galvanized

C. Controls

1. Software must be Microsoft Windows compatible, or Cloud User based.
2. Installation to include software installation onto two (2) machines and configuration for staff access.
3. Software must be capable of controlling messages on a schedule.
4. Software must be capable of controlling light dimmable on a schedule.

D. Confirm schedule with school site staff including programming for school hours, twilight, and overnight hours. Marquee should be OFF between 10pm and 5am Accessories

1. Provide bird deterrents along the top.
2. Provide an illuminated fixed sign on top with the school logo, name, and colors.

3. For displays mounted below 10 feet, provide a protective lexan cover.

Part 3 – Execution

A. Training: Provide two one-hour sessions for school administration staff and a separate training session, two-hours, for technical troubleshooting training for District staff.

B. Documentation: Provide as-built documentation with wiring diagram including underground pathway (conduit and wire) for power and communications. Submit documentation on how to adjust schedules, including review of energy savings options such as dimming or turning off marquee overnight.

10 21 13 SOLID PLASTIC TOILET COMPARTMENTS

Part 1 – General

A. Related Sections

1. 06 10 00: Rough Carpentry
2. 09 22 16: Metal Framing
3. 09 30 13: Ceramic Tiling
4. 09 29 00: Gypsum Board
5. 10 28 13: Restroom Accessories

B. Submittals

1. Provide shop drawings indicating that all minimum code required clearances are exceeded by at least 2 inches.
2. Provide product data sheet indicating all proposed options and accessories including hardware and occupancy indicators, as applicable
3. Provide product color and finish sample.

C. Warranty

Note to Design Professional: Require manufacturer's warranty

Part 2 – Products

Note to Design Professional: Do not specify solid phenolic toilet partitions. Products must meet NFP 286. Review project needs for each restroom including standard toilet compartments, increased privacy, full privacy, and all gender restroom requirements.

A. Manufacturers

1. Scranton Products http://www.scrantonproducts.com
2. Or Approved Equal

B. Model

1. Hiny Hider - Floor Mounted, Overhead Braced

a. Color: Black Paisley

C. Materials

1. Doors, panels and pilasters to be 1 inch thick constructed from High Density Polyethylene (HDPE) resins. Partitions fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers, and other writing instruments. All plastic components shall be covered with a protective plastic coating.
2. Head rails: Heavy-duty extruded aluminum (6463 - T5 alloy) with anti-grip design. The head rail has a clear anodized finish. Fasten to head rail bracket with stainless steel tamper resistant torx head sex bolts and fasten to the pilasters with stainless steel tamper resistant torx head screws.

D. Standard Stall System

1. Doors and panels to be 55-inch-high and mounted 14 inches above finished floor
    a. Review Age Group Recommendations for ADA
2. Pilasters to be 82-inch-high and fastened into one-piece 3-inch-high stainless steel pilaster shoe with stainless steel tamper resistant torx head sex bolt.
3. Hardware
    a. Hinges: 8-inch-long, heavy-duty extruded aluminum (6463 - T5 alloy) with bright dip anodized finish with wrap-around flanges, through bolted to doors and pilasters with stainless steel, torx head sex bolts.
    b. Door Strike/Keeper: 6-inch-long, heavy-duty extruded aluminum (6463 - T5 alloy) with bright dip anodized finish and screwed to the pilaster with stainless steel, tamper resistant torx head sex bolts. The bumper is to be extruded with black vinyl.
    c. Latch and Latch Housing: heavy-duty extruded aluminum (6463 - T5 alloy). Latch housing to have bright dip anodized finish and the slide bolt and button are to have black anodized finish.
    d. Coat Hook and Bumper: Each door is to be supplied with one coat hook/bumper and a pull made of chrome plated zamak. Accessible doors shall be supplied with a second pull and out swings with one doorstop made of chrome plated zamak.
    e. Wall Brackets: Continuous aluminum. Fasten with stainless steel tamper resistant torx head sex bolts.
    f. Head rail Brackets: 20-gauge stainless steel with satin finish. Fasten to wall with stainless steel tamper resistant torx head screws.

Part 3 – Execution

1. Submittals – Full & Complete Testing Results, NFPA 286
2. Warranty – Limited 25 Years

10 28 13 RESTROOM ACCESSORIES

Part 1 – General

Note to Design Professionals: Verify that specified items are accessible, especially on the limit of protrusion.

A. Related Sections
   1. 09 22 16: Metal Framing
   2. 09 29 00: Gypsum Board
   3. 09 30 13: Ceramic Tiling

B. Submittals
   1. Samples
      a. If requested by the District or Architect, submit full-size samples of specific units for review of design and operation. Acceptable samples will be returned and may be used in work.

Part 2 – Products

A. Faculty/Staff/Public Restroom
   1. Paper Towel Dispenser
      a. Bobrick B-262
      b. ASI 0210
      c. Bradley 250-15
   2. Foam Soap Dispenser (OFCI)
      a. Waxie GoJo 385781 2000 mL Dispenser
   3. Toilet Paper Dispenser
      a. Bobrick Classic Series B-2888 or approved equal

b. Bobrick B-3888 or approved equal where recessed option is required
      a.
   2. Toilet Seat Cover Dispenser
      a. Bobrick B-221
      b. ASI 0477-SM
      c. Bradley 5831
   3. Mirrors

a. One-piece roll-formed, type 304 stainless steel angle framed mirror with continuous stiffener on all sides. No. 1 quality, ¼ inch select float glass mirror with type 430 stainless steel channel frame with bright polished finish.

4. Grab Bars
   a. Heavy Duty, 18-gauge, 304 stainless steel tubing, welded with concealed mounting plate, and 22-gauge flange covers. The finish shall be peened nonslip gripping surface with satin finish.
5. Feminine Sanitary Napkin Disposal Receptacle in all Stalls
   a. Waxie 820705, –Manufacturer Bobrick B-270

B. Student Restroom

1. Foam Soap Dispenser (OFCI)
   a. K-8, MS, HS - Waxie 380003SA; Manufacturer Deb 98123 Stainless Steel Soap
   b. Elementary - Waxie GoJo 385781 2000 mL Dispenser
2. Toilet Paper Dispenser
   a. Bobrick B-2888 or approved equal
   b. Bobrick B-3888 or approved equal where recessed option is required
3. Hand Dryers
   a. Basis of Design: Excel XLERATOReco 1.1N
   b. Accessories: Noise Reduction Nozzle; ADA recessed cabinet (when required)
   c. Warranty: 7 Years
   d. Or Approved Equal
4. Feminine Sanitary Napkin Disposal Receptacle in all Stalls except dedicated preschool, TK and Kindergarten classrooms
   a. Bobrick B-270 Contura Series
   b. Or Approved Equal
5. Feminine Hygiene Product Dispenser
   a. Evogen EV1SS-Free (OFCI), Grades 6-12
   b. Bobrick Classic B-3706-C (Free, No Coin/No Token) or Trimline B-37063-C (Free, No Coin/No Token) when recessed option is needed (CFCI)
   c. Coordinate with District Representative to confirm if dispenser is required at Elementary Schools (TK-5) and if so location(s).
6. Mirrors
   a. Frameless, bright-polished stainless steel
   b. Bobrick B-1556 or approved equal
7. Grab Bars
   a. Heavy Duty, 18-gauge, 304 stainless steel tubing, welded with concealed mounting plate, and 22-gauge flange covers. The finish shall be peened nonslip gripping surface with satin finish.

C. Preschool, TK, or Kindergarten Restroom

1. Paper Towel Dispenser
   a. Bobrick B-262
   b. ASI 0210
   c. Bradley 250-15
2. Foam Soap Dispenser (OFCI)

a. Waxie GoJo 385781 2000 mL Dispenser

3. Toilet Paper Dispenser
   a. Bobrick B-2888 or approved equal
   b. Bobrick B-3888 or approved equal where recessed option is required
   c.
4. Mirrors
   a. Frameless, bright-polished stainless steel
   b. Bobrick B-1556 or approved equal
5. Grab Bars
   a. Heavy Duty, 18-gauge, 304 stainless steel tubing, welded with concealed mounting plate, and 22-gauge flange covers. The finish shall be peened nonslip gripping surface with satin finish.

D. Classroom or other Sink (non-restroom) – all grades

1. Paper Towel Dispenser
   a. Bobrick B-262
   b. ASI 0210
   c. Bradley 250-15
2. Foam Soap Dispenser (OFCI)
   a. Waxie GoJo 385781 2000 mL Dispenser
3. Custodial Accessories
   a. Provide stainless steel, type 304 shelf and mop and broom rack in custodial rooms

Note to Design Professionals:

- Do not specify warm air hand dryers. Hand Dryers are for student restrooms only.
- Foam Soap and Feminine Hygiene Product Dispenser, are to be OFCI and surface mounted. Indicate dispenser locations on the drawings and provide backing at dispenser locations when required.
- Confirm restroom backing requirements, if applicable, with manufacturer and coordinate as needed with other disciplines

Part 3 – Execution

A. Extend ceramic tile behind and above mirrors.

10 35 20 COOKING STOVES

Part 1 – General

A. Related Sections

1. Division 26 – Electrical

Part 2 – Product

A. Combination Stove tops, Ranges, and Ovens - Special Education Classroom

1. Manufacturers:
    a. Frigidaire https://www.frigidaire.com/en/kitchen-appliances/ranges/electric-range
    b. Or Approved Equal
2. Type: Electric
3. Controls: Front of unit
4. Finish: Confirm with District
5. Capacity: 5.4 cubic feet
6. Size: 29” depth, 29-7/8 inch width, 36 5/8” height
7. Features: 30 inch self-cleaning, freestanding electric range with 5 burners.
8. Power: 1800 - 3000 watt range
9. UL Listed.
10. Energy Star Certified Appliance.

Part 3 – Execution

No specific LBUSD requirements.

10 51 13 METAL LOCKERS

Part 1 – General

A. Related Sections
    1. 03 30 00 Cast in Place Concrete
    2. 06 10 00 Rough Carpentry
    3. 09 22 16 Metal Framing
    4. 09 24 23 Cement Plaster and Metal Lath
    5. 09 30 13 Ceramic Tiling
    6. 09 29 00 Gypsum Board

B. Submittals

Note to Design Professional: Require shop drawings showing anchorage and elevations of each locker.

C. Warranty

Note to Design Professional: Require manufacturer’s warranty.

Part 2 – Products

A. Manufacturers

1. De Bourgh http://www.debourgh.com
2. ASI Storage Solutions https://asi-storage.com/
3. Or Approved Equal

B. Lockers

1. Steel, 16-gauge metal.
2. Hinges: 16-gauge continuous piano hinges.
3. Ventilated in locker rooms. Louvered fronts.
4. Finish: Powder coated. locker units to be thoroughly cleaned, phosphatized and sealed. Finish being baked pure TGIC polyester powder coat with a minimum 2-3 mil thickness.
5. Handle: Recessed, lever type with two-point mechanism complying with accessibility requirements.
6. Latch: Review options, including for ADA designated lockers
7. Cups: 4 rivets
8. Locking Device: Hasp and eye for user supplied pad locks.
9. Sizes: Locker sizes may vary based on school type, function, and quantities needed

a. Small PE Locker: 12” w x 15” deep x 12” tall – Typically 1:1 based on student capacity

b. Large Backpack Locker: 18” wide x 15” deep x 18” tall – Typically 54 per PE class. Confirm total number of PE classes per period or peak capacity needed. If there are space limitations, width may be reduced but keep at minimum of 15” wide.

c.

C. Accessories

1. Top: Provide sloped tops and infill panels at corners and ends of each elevation when using full height locker systems (72” tall). For base lockers systems (36”), not including concrete base nor countertop.
2. Base: Concrete 6” base, concrete is sealed
3. Numbers required. Develop a numbering system that does not repeat locker numbers, even if the lockers are in different rooms.

Part 3 – Execution

A. Install with concealed fasteners where possible and vandal resistant fasteners where exposed.

10 56 13 METAL STORAGE SHELVING

Part 1 – General

No specific LBUSD requirements.

Part 2 – Product

A. Metal Storage Shelving

1. Manufacturers:
    a. Lyon Workspace Products http://www.lyonworkspace.com/Default.aspx
    b. Or Approved Equal
2. Model: 8000 Series Industrial Open Shelving
3. Material: 20-gauge, heavy-duty steel
4. Size: 24-inch depth, 36 inch width, 72 inch height
5. Color: Dove Gray
6. Provide 6 shelves per unit.

Note to Design Professional:

- Specify "add-on" units where possible.
- 18-inch-deep units are available for specification, if appropriate.

B. Locking Metal Storage Cabinet

1. Manufacturers:
    a. CH Equipment (basis of design) http://www.chequipinc.com/
    b. Lyon Workspace Products http://www.lyonworkspace.com/Default.aspx
    c. Or Approved Equal
2. Basis of Design Model: SC Series, SC3
3. Material: Steel
4. Size: 18-inch depth, 36 inch width, 72 inch height
5. Color: Putty (Beige)
6. Hardware: Locks, keyed alike
7. Provide a minimum of 4 adjustable shelves.

Part 3 – Execution

No specific LBUSD requirements.

10 75 16 FLAG POLES

Part 1 – General

A. Related Sections

1. 03 30 00: Cast-in-Place Concrete

B. Reference Standards

1. Flag pole design shall meet basic wind speed requirements.

Part 2 – Products

A. Aluminum Flagpoles:

1. One-piece seamless ground-set design with extruded aluminum tubing pole.
2. Cone-tapered shaft with minimum 6-inch butt diameter, and 0.1875 minimum wall base thickness. Shaft finish shall be medium satin polish, with clear hard-coat wax.
3. Exposed height shall be 25 feet.

B. Finial Ball:

1. Flush seam ball, with gold anodized finish.

C. Halyard:

1. External ball-bearing type.

D. Flag:

1. Provide one American flag and one State flag, three feet by five feet.

Part 3 – Execution

No specific LBUSD requirements.

DIVISION 11 – EQUIPMENT

11 31 00 RESIDENTIAL APPLIANCES

Part 1 – General

A. Related Sections

1. Division 22 – Plumbing
2. Division 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
3.
4. Division 26 – Electrical

Part 2 – Product

A. Refrigerators and Freezers

1. Special Education Classroom and Laboratory Preparation Room Refrigerators

a. Manufacturers:
   i. Frigidaire http://www.frigidaire.com/products/Kitchen/Refrigerators/
   ii. Or Approved Equal
b. Finish: Confirm with District
c. Size: 18.2 cubic feet, 29-7/8 inch depth, 30 inch width, and 66-1/8 inch high.
d. Provide unit with top-freezer and ice maker.
e. Power Source: 115v, 60Hz, 15 Amp, AC only electrical outlet, 3 prong cord.

2. Staff Workroom / Break Room / Dining Room Refrigerators
   a. Manufacturers:
      i. Frigidaire http://www.frigidaire.com/products/Kitchen/Refrigerators/
      ii. Or Approved Equal
   b. Finish: Confirm with District
   c. Capacity: 26.0 cubic feet
   d. Size: 35-1/2 inch depth, 36 inch width, and 69-1/8 inch high.
   e. Provide side-by-side unit with optional ice maker and through the door ice and water access.
   f. UL Listed.
   g. Energy Star Certified Appliance.
3. Nurse's / First Aid Office Refrigerators
   a. Manufacturers:
      i. Frigidaire http://www.frigidaire.com/products/Kitchen/Refrigerators/
      ii. Or Approved Equal
   b. Finish: Confirm with District
   c. Capacity: 26.0 cubic feet
   d. Size: 35-1/2 inch depth, 36-inch width, and 69-1/8 inch high.
   e. Provide side-by-side unit with ice maker and through the door ice and water access.
   f. Provide with a locking mechanism.
   g. UL Listed.
   h. Energy Star Certified Appliance.

B. Laundry Washing Machines – Locker Rooms & Special Education Classrooms
   1. Residential Units acceptable for Special Education High School only
   2. Commercial Units only for Locker Rooms

3. Manufacturers:
    a. General Electric http://www.geappliances.com/appliances/
    b. Or Approved Equal
4. Finish: White
5. Capacity: 4.1 DOE cubic feet
6. Size: 33-3/5 inch depth, 27 inch width, 39-4/5 inch height
7. Provide a front-loading unit with cycles for colors/normal, stain wash, NSF sanitize, delicates/hand wash, speed wash, drain, and spin.
8. Power Source: 120 Volts and 3 prong cord
9. UL Listed.
10. Energy Star Certified Appliance.

C. Laundry Dryers – Locker Rooms & Special Education Classroom
1. Residential Units acceptable for Special Education High School only
2. Commercial Units only for Locker Rooms
    a. Manufacturers:
        i. General Electric http://www.geappliances.com/appliances/
        ii. Speed Queen
        iii. Or Approved Equal
    b. Type: Front loading
    c. Finish: White
    d. Capacity: 7.0 cubic feet
    e. Size: 32 inch depth, 27 inch width, and 39 inch high.
    f. Temperature Options: high, medium, low, and extra low.
    g. Control Type: Rotary-Electronic with LED lighting.
    h. Heat Selection: 4.HE sensor dry, speed dry, dual thermistors.
    i. Power Source: 240/208 volts with 4 prong cord #WX09X10018, NEMA 14-30R, no substitutions.
    j. Provide with UL rated, 8 feet, semi-rigid dryer duct.
    k. Energy Star Certified Appliance

D. Washing Machines – Custodial
1. Manufacturers:
    a. GE

b. Speed Queen
c. Or Approved Equal

2. Model:
3. Finish: White
4. Capacity: 13 lbs. wash capacity
5. Size: 22 inch depth, 22 inch width, 36 inch height
6. Programmable: up to 24 hours in advance
7. Functions: ultra-dry spin cycle, automatic pump out
8. UL Listed.
9. Energy Star Certified Appliance.

Part 3 – Execution

No specific LBUSD requirements.

11 52 13 PROJECTION SCREENS

Part 1 – General

A. Related Sections

1. 05 10 00: Structural Metal Framing
2. 06 10 00: Rough Carpentry
3. 09 29 00: Gypsum Board
4. 09 50 00: Acoustical Panel Ceilings
5. Division 26 – Electrical
6. 27 41 16: Audio Visual Systems

Part 2 – Products

A. Manufacturers

1. Legrand | AV Da-Lite Screen Company https://www.legrandav.com/products/da-lite
2. Or Approved Equal

B. Projection Screen

Location	Manufacturer	Model	Size	Installation	Motorized or Manual

Classroom Conference Room, Library, and Portable Classroom	Legrand, or Approved Equal	AV Da-Lite – Model C with CSR, or District Approved Equal	60" H x 96" W or 113" diagonal (16:10)	Wall Mounted	Manual
Cafeteria Small MPR	Legrand, or Approved Equal	AV Da-Lite, or District Approved Equal	16:10 A/E to recommend size to fit space.	As Indicated on Drawings	Manual
Elementary and Middle School (Small) Auditorium	Legrand, or Approved Equal	Da-Lite 70256L, or District Approved Equal	208" diagonal, 110" x 176" (16:10)	Ceiling Mounted	Motorized
High School (Large) Auditorium	Legrand, or Approved Equal	Da-Lite Professional Tensioned Electrol Part #27258C, or District Approved Equal	340" diagonal, 180" x 288" (16:10)	Ceiling Mounted	Motorized

1. Screen Format: Auditoriums: HDTV; All Other Locations: Wide
2. Viewing Surface: Matte white.
3. Enclosure: White
4. Mounting Kit: Floating mount kit is acceptable in portable classroom buildings.

Part 3 – Execution

A. Installation:

1. Installation per manufacturer's recommendations.
2. Verify screen will pull down and clear all obstructions prior to installation.
3. Screen Location:
   i. Classroom: Location shall be on wall designated as primary teaching wall ~~on~~
   ii. Library: Locate screen as indicated on contract drawings. Verify the screen will clear bookshelves when lowered. Leave space to account for books which may protrude from the shelves.
   iii. Auditorium: Screens shall be centered on the stage and mounted on the proscenium area. Refer to drawings for exact location. Coordinate installation with stage lighting.
4. Verify install height of screen with District Technology Representative prior to installation.

B. **Note to Design Professional:**

1. Coordinate motorized screen power requirements with electrical engineer.
2. Size motorized screens accordingly to fit the room. The minimum screen height shall be 1/8 the maximum intended viewing distance, per InfoComm recommendations.
3. Projection screen may be ceiling or wall mounted.
4. Confirm installation method at each location.
5. Coordinate projection screen and lighting, including stage lighting at Auditoriums.
6. Where there are no suitable walls for wall mounted projectors, such as Libraries, install ceiling mounted.
7. Mount screens as high as possible in classrooms for optimal viewing.

11 53 00 LABORATORY EQUIPMENT

Part 1 – General

A. Related Sections

1. 12 35 53: Laboratory Casework
2. Division 22: Plumbing
3. Division 23: HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
4. Division 26: Electrical

B. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that applies to the fume hood(s) for the specific project.

Part 2 – Products

A. Fume Hood

1. Manufacturers
   a. Kewaunee Scientific Corporation http://www.kewaunee.com/lab.aspx
   b. Hamilton Laboratory Solutions: http://www.hamiltonlab.com/
   c. Or Approved Equal

B. Emergency Eye/Face Wash and Shower Combination

1. Manufacturers
   a. Watersaver Model SSBF2150 or Approved equal – ADA compliant fully recessed emergency eye/face wash and shower combination unit with stainless steel cover.

Note to Design Professional: Provide floor drain under shower head.

Part 3 – Execution

No specific LBUSD requirements.

11 61 53 CHORAL RISERS

Part 1 – General

A. Related Sections

1. 11 61 43: Stage Curtains

B. Warranty:

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

1. Sisco, Harmony Choral Risers http://www.sicoinc.com/choralrisers.php
2. Wenger http://www.wengercorp.com/Risers/index.html
3. Or Approved Equal

B. Materials

1. Rear and side guardrail
2. Welded aluminum frame, black finish
3. Four wheeled, lockable
4. Carpeted top and sides
5. Folding to vertical position
6. Cam connectors for multiple riser connections.
7. Fully assembled on delivery
8. Overlapping risers
9. Reversing steps

Part 3 – Execution

A. Training

1. Provide a one hour training session for District staff.

11 66 00 ATHLETIC EQUIPMENT

Note to Design Professional:

- Coordinate required supports for basketball backstops with structural engineer, and motorized system requirement with electrical engineer.
- Coordinate floor sleeves with concrete slabs and floor finishes.
- Coordinate retractable practice court backstops for required vertical clearance.

Part 1 – General

A. Section Includes (Indoor)

1. Gymnasium basketball backstops.
2. Volleyball floor sleeves and accessories.
3. Badminton floor sleeves and accessories.
4. Electronic scoreboard and timers.
5. Gymnasium protective wall pads.

B. Related Sections

1. 03 30 00: Cast in Place Concrete
2. 04 22 00: Concrete Unit Masonry
3. 05 12 00: Structural Steel Framing
4. Division 26 – Electrical

C. Warranty:

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

1. Gymnasium Basketball Backstops, Volleyball and Badminton Floor Sleeves, and Gymnasium Wall Pads
   a. Porter Athletic Equipment Company http://www.porterathletic.com/
   b. Or Approved Equal
2. Electronic Scoreboard and Timers
   a. Fair-Play http://www.fair-play.com/
   b. Or Approved Equal

B. Gymnasium Basketball Backstops

1. Porter 900 series, heavy duty front-braced/forward-fold structure with fully welded vertical front frame assembly. Provide motorized height adjuster with remote-controlled, heavy-duty winch with safety lock for backstop.

2. Rectangular tempered glass backboards shall have safety padding.
3. Provide movable flex goals with shock absorber.

C. Volleyball and Badminton Floor Sleeves and Accessories

1. Heavy duty floor sleeves and covers suitable for floor system.
2. Volleyball and badminton systems accessories shall include complete competition system standards of uprights/posts, tensioning winch, nets, net antenna, protective padding, and transport/storage system.

D. Electronic Scoreboard and Timers

Note to Design Professional:

- Specify one shot clock for each main court basketball backstop.
- Specify a minimum 6 feet high by 8 feet wide LED scoreboard capable of scoring basketball, volleyball, badminton, and wrestling. Provide compatible scoring console system.
- Specify a wired control, even if the scoreboard is wireless, at High School exterior scoreboards.

E. Gymnasium Wall Pads

Note to Design Professional: Provide a minimum of 6 feet high vinyl wall pad panels around gymnasium walls where required.

Part 3 – Execution

A. Install per manufacturer's recommendations.

11 68 00 PLAYFIELD EQUIPMENT AND STRUCTURES

Part 1 – General

A. Section Includes (Outdoor)

1. Play structures.
2. Basketball backstops.
3. Volleyball floor sleeves and accessories.
4. Tether ball sleeves and accessories.
5. Exterior scoreboards.

B. Related Sections

1. 03 20 00: Concrete Reinforcement
2. 03 30 00: Cast in Place Concrete
3. 05 12 00: Structural Steel Framing

4. 26 00 00: Electrical Sections
5. 27 00 00: Low Voltage Sections
6. 32 12 16: Asphalt Paving
7. 32 13 13: Site Concrete
8. 32 18 16.13: Playground Protective Surfacing

C. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Play Structures

1. Manufacturer
   a. Miracle Recreation http://www.miracle-recreation.com/
   b. Dave Bang Associates, Inc. http://www.davebang.com
   c. RecWest Outdoor Products, Inc. http://www.recwest.com
   d. Or Approved Equal

B. Basketball Backstops

Note to Design Professional: Provide single extended backstops.

1. Manufacturers
   a. LA Steelcraft http://www.lasteelcraft.com/
   b. Or Approved Equal.
2. LA Steelcraft Model 1244 single sided fan shaped exterior basketball post.
   a. 4-1/2 inch OD galvanized pipe with welded cap and 4 foot extension.
   b. 1 inch OD pipe welded to in ground portion to prevent rotation.
   c. 1 inch OD P/C tube bracing.
3. LA Steelcraft Model 07 rectangular steel plate backboard with electrostatically powder coated white.
4. LA Steelcraft Model 600N heavy duty double basketball goal ring.
5. Hot dipped galvanized all components.

C. Volleyball Floor Sleeves and Accessories

1. Posts: Removable 3-1/2 inch galvanized steel posts, must be monolithic, 9 ga. min.

D. Tether Ball Sleeves and Accessories

1. Posts: Removable, galvanized steel posts, must be monolithic, 9 ga. min.

E. Exterior Scoreboards

1. Manufacturers
    i. Fair-Play http://www.fair-play.com
    ii. Nevco http://www.nevco.com
    iii. Daktronics http://www.daktronics.com
    iv. Or Approved Equal
2. Signs
    i. Display: Illuminated digital display with electronic captions and team names. Additional panels (optional) for school team name and logo
    ii. Size: 24'L x 8'H minimum cabinet size
    iii. Finish: Galvanized
3. Controls
    i. Provide wired and wireless controls

Part 3 – Execution

No specific LBUSD requirements.

11 95 13 KILNS

Note to Design Professional: kiln ventilation system is to be design and specified as recommended by the kiln manufacturer.

Part 1 – General

A. Related Sections

1. Division 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
2. Division 26 – Electrical

B. Warranty:

Note to Design Professional: Require manufacturer's warranty.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that applies to the kiln hood(s) for the specific project.

Part 2 – Products

A. Manufacturer

1. Skutt http://www.skutt.com/
2. Or Approved Equal

B. Electric Kiln
    1. Model: Skutt KM1227-3
        a. Access: Top load, spring-loaded Lid Lifter
        b. Chamber Capacity: 5.25 Cu. Ft., min.
        c. Chamber Dimensions: 23 inch diameter, 22 inch high
        d. Power Requirements: 3 phase, 208 volt, 31.7 amps, 11,000 watts, 23,000 BTU's
        e. Controller: KilnMaster Controller
        f. Provide complete assembly including: stand, extra thermocouple, peep plugs, etc.

C. Kiln Ventilation
    1. Model: Skutt EnviroVent 2
        a. Material: Aluminum
        b. Duct: 3 inch diameter, 8 foot length, U.L. listed, flexible aluminum
        c. Power Requirements: 115 volt, 1.4 amp
        d. Control: In-line power switch
        e. Air Volume: 140 CFM

Part 3 – Execution

A. Install per manufacturer's recommendations.

DIVISION 12 – FURNISHINGS

12 20 00 WINDOW TREATMENTS

Part 1 – General

A. Related Sections
    1. 08 50 00: Series Windows
    2. 09 22 16: Metal Framing
    3. 09 29 00: Gypsum Board

B. References
    1. Window Covering Manufacturers Association (WCMA)
        i. WCMA A100.1 - Safety of Window Covering Products; latest edition

C. Submittals

Note to Design Professional:

- Require shop drawings showing floor plan and elevations of each window and control diagrams.
- Require that the location of the pull chain or controllers and motors be shown on the submittal.

D. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

1. MechoShade Systems http://mechoshade.com/
2. Mariak http://www.mariak.com/
3. Skyco http://www.skycoshade.com/
4. Draper http://www.draperinc.com/WindowShades/index.asp
5. Or Approved Equal

B. Product

1. Shades to comply with WCMA A100.1
2. Flame Resistance Rating: Pass NFPA 701
3. Darkening Shade Material

   Note to Design Professional:

   - Shade material to be a maximum of 3 percent open.
   - Color to be selected from manufacturer's standard line.

4. Black-out Shade Material

   Note to Design Professional:

   - Shade material to be 0-1 percent open.
   - Color to be selected from manufacturer's standard line.

5. Rollers and Housing
   a. Electro-galvanized or epoxy primed steel or extruded aluminum tube and wall thickness of appropriate diameter and gauge to not sag over required spans.
   b. Assembly must be easy to remove for replacement of material.
6. Brackets
   a. Galvanized or zinc-plated steel.
7. Operators

a. Manual: stainless steel chain pulls.

b. Chain Retainer: Chain tensioning device complying with WCMA A100.1

Part 3 – Execution

Note to Design Professional: Require manual chains to be located within 48 inches of finish floor.

12 35 53 LABORATORY CASEWORK

Note to Design Professional:

- Require coordination between plumbing and cabinet installer for sinks, gas cocks and countertop eye washes.
- Do not use Architectural Woodwork Institute guidelines to specify scientific casework.

Part 1 – General

A. Related Sections

1. 06 10 00: Rough Carpentry
2. 09 22 16: Metal Framing
3. 09 29 00: Gypsum Board
4. 11 53 00: Laboratory Equipment
5. 22 40 00: Plumbing
6. Division 26, Electrical

B. Submittals

Note to Design Professional: Require shop drawings showing floor plans and elevations of casework, including sinks and lab equipment accessories.

Part 2 – Products

A. Manufacturers

1. Kewaunee Scientific http://kewaunee.com
2. Hamilton Laboratory Solutions: http://www.hamiltonlab.com/
3. Or Approved Equal

B. Products

Note to Design Professional:

- Sinks to be epoxy resin, integral to the countertops and specified in this section, reference on the plumbing schedule. Faucets, countertop eye washes, and gas cocks to remain in plumbing.

- Countertops to be one inch thick, epoxy resin, black.
- Cabinets to be wood, maple veneer finish.

Part 3 – Execution

No specific LBUSD requirements.

12 56 13 FOLDING TABLES AND BENCHES

Part 1 – General

A. Related Sections

1. 06 10 00: Rough Carpentry
2. 09 22 16: Metal Framing
3. 09 29 00: Gypsum Board
4. 09 90 00: Painting and Coating

B. Submittals

Note to Design Professional: Require shop drawings showing floor plans and elevations of table configurations, including pocket construction details and sizes.

C. Warranty

Note to Design Professional: Require manufacturer's warranty on tables, benches, and hardware.

Part 2 – Products

A. Manufacturers

1. Palmer Hamilton LLC, Hamilton Series http://www.palmerhamilton.com
2. No known equal

B. Products

Note to Design Professional:

- Tables and benches are to be recessed wall pocket systems.
- Tables and benches are to be detachable from and interchangeable with pockets.
- Specify tables 29 to 30 inches wide.
- Specify 5 percent accessible units. Accessible units are to be furnished filler piece in pocket to accommodate the shorter bench.
- Specify the standard, factory installed mullion cylinder locks. Cylinders to be keyed alike.

1. Tabletop frame shall be 16-gauge steel box channels with returned edges rolled to 11gauge.
2. Track lock and automatic locking anti-jackknife device.
3. Plastic laminate tops and benches with factory baked on primer.
4. Wall Pockets: Welded construction, 16-gauge steel frame, field painted.

Part 3 – Execution

Note to Design Professional: Renovation projects require field verification of existing pockets prior to ordering tables and benches.

12 61 00 FIXED AUDIENCE SEATING

Part 1 – General

A. Related Sections
   1. 03 30 00: Cast in Place Concrete
   2. Division 9 – For Floor Finishes.

B. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers
   1. Irwin Seating Company http://www.irwinseating.com/index.php
   2. Or Approved Equal

B. Materials
   1. Heavy duty powder coated steel supports.
   2. Upholstery fabric shall be vinyl.
   a. Color: Black
   3. Self-lifting seats.

C. Accessible Seating
   1. Provide removable chairs where wheelchair spaces are indicated.
   2. Provide chairs with fold-up arm on aisle side, up to percentage required by ADA. Identify these seats with a sign.

Part 3 – Execution

No specific LBUSD requirements.

12 66 13 TELESCOPING BLEACHERS

Part 1 – General

A. Related Sections

1. 03 30 00: Cast in Place Concrete
2. 04 22 00: Concrete Unit Masonry
3. 05 12 00: Structural Steel Framing
4. 09 64 53: Resilient Wood Flooring Assemblies
5. Division 26 – Electrical

B. Submittals

Note to Design Professional: Require shop drawings signed and stamped by a licensed engineer. This is a DSA deferred approval item. Require early submittal in order to allow time for DSA review and approval.

C. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

6. Hussey Seating Company: MAXAM Telescopic Gym Seat System http://www.husseyseating.com/
7. Interkal https://www.interkal.com/
8. Or Approved Equal

B. Operation

1. Integral power system per manufacturer, with a removable pendant control unit.

C. Seats

Note to Design Professional:

- Incorporate ADA wheelchair seating spaces, team seating, and scorer's areas into first row modular sections.
- Specify size, colors, and complexity if a logo is required.
- Seats shall be polyethylene plastic.

D. Accessories

1. Provide end closure curtain, handrails and guardrails.

Part 3 – Execution

No specific LBUSD requirements.

DIVISION 14 – CONVEYING SYSTEMS

14 24 23 HYDRAULIC PASSENGER ELEVATORS

Part 1 – General

A. Related Sections

1. 03 30 00: Cast-in-Place Concrete
2. 08 71 00: Door Hardware
3. 09 29 00: Gypsum Board
4. 09 65 00: Resilient Flooring
5. 21 13 13: Fire Suppression System
6. Division 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
7. Division 26 – Electrical

B. Reference Standards

1. Chapter 11B of the CBC.
2. Title 8, Elevator Code.

C. Submittals

Note to Design Professional: Require contractor to submit drawings and calculations and to obtain DSA deferred approval for guide rails.

D. Closeout Submittals

1. Service Contract
   a. Provide a service contract to District for the manufacturer's standard service period required to maintain the standard warranty. The service company shall respond within 4 hours when contacted during regular business hours, Monday through Friday.

Part 2 – Products

A. Manufacturers:

1. ThyssenKrupp Elevator http://www.thyssenkruppelevator.com/

2. Or Approved Equal

B. Type: Pre-engineered hydraulic elevator systems for passenger use, with hole less (above-ground) jacks.

1. Basis of Design Model: Endura series, 4,000 lbs. capacity

C. Accessories:

Note to Design Professional:

- Provide dedicated analog phone line to elevator cab
- Provide flooring for cab, include on finish schedule on the Drawings.
- Coordinate access control card system along with override key control. Intent is for access control system to be primary method with hard key to be used in case of access control failure. Coordinate so that hard-key or access control can call elevator cab or wheelchair lift.

Part 3 – Execution

A. Coordinate elevator room and equipment room clearance requirement with manufacturer.

B. Program the elevator's emergency phone to dial School Safety, (562) 997-8101.

14 42 16 WHEELCHAIR LIFTS

Note to Design Professional: Specify wheelchair lifts in renovation projects only.

Part 1 – General

A. Related Sections

1. 03 30 00: Cast-in-Place Concrete
2. Division 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
3. Division 26 – Electrical

B. Reference Standards

1. Chapter 11B of the CBC.
2. Title 8, Elevator Code.

C. Closeout Submittal

1. Provide a service contract to District for the manufacturer's standard service period required to maintain the standard warranty. The service company shall respond within 2 hours when contacted during regular business hours, Monday through Friday, 7am to 4:30pm.

D. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

1. Garaventa Lift http://www.garaventalift.com/
2. Or Approved Equal

Part 3 – Execution

Note to Design Professional:

- Provide space for an electrical disconnect and controls.
- Recess lift into slab at new construction, provide manufacturer's ramp at renovations.

A. Training

Note to Design Professional: Require training on how to conform to State laws for proper record keeping and maintenance of the lift.

DIVISION 21 – FIRE SUPPRESSION

21 13 13 FIRE SUPPRESSION SPRINKLER SYSTEM

Part 1 – General

A. Related Sections

1. 03 30 00: Cast-In-Place Concrete
2. 22 10 00: Plumbing
3. 33 11 00: Site Water Distribution Utilities

B. Reference Standards

1. Comply with NFPA 13 Installation of Sprinkler Systems

C. Submittals

1. Shop Drawings at 1/8-inch scale.
2. Hydrology calculations to confirm original design information.

D. Extra Stock

Note to Design Professional: Verify with District Representative extra stock for the project is necessary prior to specifying.

1. Four sprinkler heads or 2 percent of total, whichever is greater, and related removal tool.

Part 2 – Products

A. Manufacturer

1. Hangers and Supports

a. Cooper Industries Tolco Seismic Bracing http://www.cooperindustries.com

b. Or Approved Equal

B. Piping

1. Underground: Ductile iron, size as specified on the drawings, with gasketed, mechanical couplers.

2. Fire sprinkler pipe – 1 through 8 inches, Schedule 40 black pipe. Pipe Corrosion Resistance Ratio (CRR) shall be 1.00 or greater. Pipe may be threaded or grooved.

a. Piping 2 inches and smaller shall have threaded joints and fittings in all concealed, non-accessible locations. Groove coupler connections on pipe sizes 1 inch through 2 inches are acceptable in all accessible. Plain end connections are prohibited.

b. For pipe sizes 2 ½ inches and larger, grooved type, welded, threaded and flanged connections. Connections that do not utilize a threaded, welded or grooved connection are prohibited, except for mechanical tee bolt-on branch outlet fittings sizes 2 inches and smaller.

C. Fire Riser

1. Inspector's Drain Line

2. Flow switch and meter to activate fire alarm system and audible alarm.

3. Audible alarm

4. Connection to Fire Alarm Control Panel

D. Fire Department Connection (FDC) per local fire authority's requirements.

E. Post Indicator Valve (PIV) shall be electrically supervised and have the handle locked in place with a break-a-way lock.

F. Sprinkler Heads

1. Concealed at finished ceilings, with white covers.

2. Poly-coated glass bulb type where exposed to weather.

G. Gate Valves:

1. Bronze gate valves: 2 inches and smaller, class 175, solid bronze wedge disc, rising stem copper silicon alloy stem, UL/FM listed, threaded ends:

2. Iron gate valves: 2-1/2 inches and larger, class 175, IBBM, solid wedge disc, Teflon impregnated packing, UL/FM listed, flanged end.

H. Hangers and Supports

1. Hangers and support to be per SMACNA.

Part 3 – Execution

Note to Design Professional: Require a spare sprinkler head box be installed in a custodial area.

A. Perform hydrostatic test and flush test at completion.

DIVISION 22 – PLUMBING

22 05 13 COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

Part 1 – General

A. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Materials

1. Polyphase Motors: Design B, medium induction motors.
    a. Efficiency: Energy efficient.
    b. Service Factor: 1.15.
    c. Multispeed Motors: Variable torque.
    d. Rotor: Random-wound, squirrel cage.
    e. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
    f. Temperature Rise: Match insulation rating.
    g. Insulation: Class F.
    h. Code Letter Designation:
        i. Motors 15 HP and Larger: NEMA starting Code F or Code G.
        ii. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
2. Polyphase Motors with Additional Requirements:
    a. Motors used with reduced-voltage and multispeed controllers.
    b. Energy- and premium-efficient and Inverter-duty motors used with variable frequency controllers.
    c. Severe-duty motors.
3. Single-Phase Motors:

a. Motors Larger than 1/20 HP: Permanent-split capacitor; split phase; capacitor start, inductor run; or capacitor start, capacitor run to suit starting torque and requirements of specific motor application.

b. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

c. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

d. Motors 1/20 HP and Smaller: Shaded-pole type.

e. Internal thermal protection.

22 05 17 SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

Part 1 – General

A. Related Sections

1. 07 84 13: Penetration Firestopping
2. 22 11 19: Domestic Water Piping
3. 22 13 16: Sanitary Waste and Vent Piping
4. 22 14 13: Facility Storm Drainage Piping

B. Submittals

Note to Design Professional: Require firestopping materials submittal.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

A. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping".

22 05 18 ESCUTCHEONS FOR PLUMBING PIPING

Part 1 – General

A. Related Sections

1. 22 11 19: Domestic Water Piping
2. 22 13 16: Sanitary Waste and Vent Piping

3. 22 14 13: Facility Storm Drainage Piping

Part 2 – Products

A. Escutcheons shall be chrome-plated steel or chrome-plated cast brass.

Part 3 – Execution

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

22 05 19 METERS AND GAGES FOR PLUMBING PIPING

Part 1 – General

A. Section Includes

1. Thermometers.
2. Thermowells.
3. Pressure gages.
4. Gage attachments.
5. Test plugs and test plug kits.

Part 2 – Products

A. Bimetallic-Actuated Thermometers

1. Case: Liquid-filled and sealed type(s); stainless steel; 5-inch diameter.
2. Dial: Non-reflective aluminum with etched scale in deg F.
3. Connector Type(s): Union joint, adjustable angle.
4. Window: Plain glass.

B. Filled-System Thermometers

1. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:
    a. Case: Sealed type, cast aluminum or drawn steel; 5-inch diameter.
    b. Movement: Mechanical, dampening type.
    c. Dial: Non-reflective aluminum with etched scale in deg F.
    d. Window: Glass.
    e. Ring: Stainless steel.

f. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.

2. Remote-Mounted, Metal-Case, Vapor-Actuated Thermometers:
   a. Case: Sealed type, cast aluminum or drawn steel; 6-inch diameter with front flange for panel mounting.
   b. Dial: Non-reflective aluminum with etched scale in deg F.
   c. Window: Glass.
   d. Ring: Stainless steel.
   e. Connector Type(s): Union joint, back.
3. Metal-Case, Compact-Style, Liquid-In-Glass Thermometers:
   a. Case: Cast aluminum; 6-inch size.
   b. Case Form: Back angle.
   c. Tube: Glass with magnifying lens and blue or red organic liquid.
   d. Tube Background: Non-reflective aluminum with etched scale in deg F.
4. Thermowells
   a. Material for Use with Copper Tubing: CNR or CUNI.
   b. Material for Use with Steel Piping: CRES or CSA.
   c. Type: Stepped shank unless straight or tapered shank is indicated.
   d. Heat-Transfer Medium: Mixture of graphite and glycerin.
5. Pressure Gages
   a. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
      i. Case: Liquid-filled Solid-front, pressure relief type(s); cast aluminum or drawn steel; 4-1/2-inch diameter.
      ii. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
      iii. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
      iv. Dial: Non-reflective aluminum with etched scale in psi.
      v. Window: Glass.
      vi. Ring: Stainless steel.
      vii. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.
6. Remote-Mounted, Metal-Case, Dial-Type Pressure Gages
   a. Case: Sealed type; cast aluminum or drawn steel; 4-1/2-inch diameter with front flange for panel mounting.

b. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.

c. Dial: Non-reflective aluminum with etched scale in psi.

d. Window: Glass.

e. Ring: Stainless steel.

f. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

7. Gage Attachments

a. Snubbers: Brass; with NPS 1/4, and piston or porous-metal-type surge-dampening device. Include extension for use on insulated piping.

b. Valves: Brass or stainless-steel needle, with NPS 1/4, pipe threads.

8. Test Plugs: Test-station fitting made for insertion into piping tee fitting.

9. Test-Plug Kits: Furnish one test-plug kit(s) containing one thermometer(s), one pressure gage and adapter, and carrying case.

Part 3 – Execution

A. Installation

1. Install thermometers in the following locations:

a. Inlet and outlet of each water heater.

b. Inlets and outlets of each domestic water heat exchanger.

c. Inlet and outlet of each domestic hot-water storage tank.

d. Inlet and outlet of each remote domestic water chiller.

2. Install pressure gages in the following locations:

a. Building water service entrance into building.

b. Inlet and outlet of each pressure-reducing valve.

c. Suction and discharge of each domestic water pump.

22 05 23 GENERAL-DUTY VALVES FOR PLUMBING PIPING

Part 1 – General

A. Section Includes

1. Low-pressure, compressed-air valves.

2. Domestic hot and cold water valves.

B. Related Sections

1. 22 05 53: Identification for Plumbing Piping and Equipment, for valve tags and schedules.
2. 22 11 13: Facility Water Distribution Piping, for valves applicable only to this piping.
3. 22 11 19: Domestic Water Piping Specialties, for valves applicable only to this piping.
4. 22 13 19: Sanitary Waste Piping Specialties, for valves applicable only to this piping.
5. 22 14 23: Storm Drainage Piping Specialties, for valves applicable only to this piping.

C. Submittals

Note to Design Professional: Include submittal requirement for domestic water valves to meet the lead-free requirements of California HSC section 116875 and to comply with NSF 61.

Part 2 – Products

A. Low-pressure, compressed-air valves (Thru 150 psi).

1. Pipe NPS 2 and Smaller:
    a. Ball Valves: Two piece, full port, bronze with bronze or stainless-steel trim.
    b. Bronze Lift Check Valves: Class 125, bronze disc.
    c. Bronze Swing Check Valves: Class 125 or Class 150, bronze disc.
    d. Bronze Gate Valves: Class 150, NRS or RS.
2. Pipe NPS 2-1/2 and Larger:
    a. Iron, Single-Flange Butterfly Valves: 200 CWP, NBR seat, aluminum-bronze or stainless-steel disc.
    b. Iron, Grooved-End Butterfly Valves: 300 CWP.
    c. Iron Swing Check Valves: Class 125, metal seats.
    d. Iron, Grooved-End Swing Check Valves: 300 CWP.
    e. Iron, Center-Guided Check Valves: Class 250, compact-wafer, metal seat.
    f. Iron, Plate-Type Check Valves: Class 250; single or dual plate; metal seat.
    g. Iron Gate Valves: Class 125, NRS.

B. Domestic, hot- and cold-water valves:

1. Pipe NPS 2 and Smaller:
    a. Bronze Angle Valves: Class 150, bronze disc.
    b. Ball Valves: Two piece, full port, brass or bronze with brass, bronze, or stainless-steel trim.
    c. Bronze Swing Check Valves: Class 125 or Class 150, bronze disc.
    d. Bronze Gate Valves: Class 150, NRS or RS.
    e. Bronze Globe Valves: Class 150, bronze disc.

2. Pipe NPS 2-1/2 and Larger:
    a. Iron Ball Valves: Class 150.
    b. Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze or stainless-steel disc.
    c. Iron, Grooved-End Butterfly Valves: 175 CWP.
    d. Iron Swing Check Valves: Class 125, metal seats.
    e. Iron Swing Check Valves with Closure Control: Class 125, lever and weight.
    f. Iron, Grooved-End Swing Check Valves: 300 CWP.
    g. Iron, Center-Guided Check Valves: Class 250, compact-wafer, metal seat.
    h. Iron, Plate-Type Check Valves: Class 250; single or dual plate; metal seat.
    i. Iron Gate Valves: Class 125, NRS. Provide AWWA resilient wedge gate valve outside building.
    j. Iron Globe Valves: Class 250.

Part 3 – Execution

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

22 05 29 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

Part 1 – General

A. Related Sections
    1. 05 50 00: Metal Fabrications, for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
    2. 22 05 16: Expansion Fittings and Loops for Plumbing Piping, for pipe guides and anchors.
    3. 22 05 48: Vibration and Seismic Controls for Plumbing Piping and Equipment

B. Quality Assurance
    1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
    2. ASME Boiler and Pressure Vessel Code.

Part 2 – Products

A. Performance Requirements: Pipe hangers and equipment supports including seismic anchorage and restraint designed and documented in accordance with California Building Code as amended by Division of the State Architect.

B. Components

1. Metal Pipe Hangers and Supports: Carbon steel.
2. Trapeze pipe hangers.
3. Metal Framing Systems: MFMA manufacturer.
4. Thermal-hanger shield inserts.
5. Fastener Systems: As required by Project structural engineer.

Note to Design Professional:

- Use of Dura-Blok rooftop supports, by Eaton, and similar supports are allowed.
- Request District approval prior to specifying rooftop supports made of wood; submit a Variance Request.

Part 3 – Execution

A. Hanger and Support Installation:

1. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
    a. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
    b. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
2. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
3. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

22 05 48 VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

Part 1 – General

A. Related Sections

1. 21 05 48: Vibration and Seismic Controls for Fire-Suppression Piping and Equipment, for devices for fire-suppression equipment and systems.
2. 23 05 48: Vibration and Seismic Controls for HVAC, for devices for HVAC equipment and systems.

B. Submittals

Note to Design Professional: Include requirement for Coordination Drawings for vibration isolation device installation and seismic bracing for plumbing piping and equipment, including other supports and restraints.

Part 2 – Products

A. Performance Requirements

Note to Design Professional:

- Coordinate with Project structural engineer relative to seismic controls.
- Provide documentation in plans and specifications required to obtain DSA approval and convey scope of seismic controls for Project to Contractor.
- Coordinate vibration controls with acoustical consultant if part of Project team.

B. Components

1. Vibration Isolators: Suitable for application.
2. Seismic Restraint Devices:
    a. Snubbers: Welded structural-steel shapes and replaceable resilient isolation washers and bushings.
    b. Restraint Channel Bracings: MFMA-4, shop- or field-fabricated bracing assemblies.
    c. Restraint Cables: ASTM A 603 galvanized-steel cables.
    d. Hanger-Rod Stiffener: Reinforcing steel angle clamped to hanger rod.
    e. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
    f. Anchor Bolts: Mechanical type, seismic rated.

Part 3 – Execution

A. Installation

Note to Design Professional: Coordinate all attachments to building structure with Project structural engineer.

1. All seismic restraint devices shall be installed in accordance with their listings.

22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

Part 1 – General

No specific LBUSD requirements.

Part 2 – Products

A. Materials

1. Equipment Labels: Metal.
2. Warning Signs and Labels: 1/8 inch thick with fasteners.
3. Pipe Labels: Pretensioned.
4. Stencils: Fiberboard or metal.
5. Valve Tags: Brass, 0.032-inch minimum thickness.
6. Warning Tags: Approximately 4 by 7 inches; brass grommet and wire fasteners.

Part 3 – Execution

A. Equipment Label Installation: Install or permanently fasten labels on each major item of mechanical equipment. Locate equipment labels where accessible and visible.

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

22 07 16 PLUMBING EQUIPMENT INSULATION

Part 1 – General

A. Related Sections

1. 22 07 19: Plumbing Piping Insulation

B. Submittals

1. Product Data: Provide for each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).
2. Product Data for California Green Building Standards Code Compliance: For adhesives and sealants, including primers, documentation of compliance including printed statement of VOC content and chemical components.

3. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Quality Assurance

1. Surface-Burning Characteristics: Flame-spread index of 25, and smoke-developed index of 50 for insulation installed indoors; according to ASTM E 84.
2. Comply with California Energy Code.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

A. Indoor, Field-Applied Jacket Schedule

1. Equipment, Concealed: PVC, Aluminum, or Painted aluminum.
2. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches: PVC, Aluminum, or Painted aluminum.
3. Equipment, Exposed, Larger Than 48 Inches in Diameter or with Flat Surfaces Larger Than 72 Inches: Aluminum or Painted aluminum.

B. Outdoor, Field-Applied Jacket Schedule

1. Equipment, Concealed: PVC, Aluminum, or Painted aluminum.
2. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches: Aluminum or Painted aluminum.
3. Equipment, Exposed, Larger than 48 Inches in Diameter or with Flat Surfaces Larger than 72 Inches: Aluminum or Painted aluminum.

22 07 19 PLUMBING PIPING INSULATION

Part 1 – General

A. Related Sections

1. 22 07 16: Plumbing Equipment Insulation

B. Submittals

1. Product Data: Provide for each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).

2. Product Data for California Green Building Standards Code Compliance: For adhesives and sealants, including primers, documentation of compliance including printed statement of VOC content and chemical components.
3. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Quality Assurance

1. Surface-Burning Characteristics: Flame-spread index of 25, and smoke-developed index of 50 for insulation installed indoors; according to ASTM E 84.
2. Comply with California Energy Code.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

A. Piping Insulation Schedule, General

1. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
   a. Drainage piping located in crawl spaces.
   b. Below-grade piping.
   c. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
2. Indoor Piping Insulation Schedule
   a. In addition to code-mandated insulation, insulation shall be required for horizontal rainwater lines and plumbing drain lines in noise-sensitive locations.
3. Indoor, Field-Applied Jacket Schedule
   a. Piping, Concealed: PVC, Aluminum, or Painted aluminum.
   b. Piping, Exposed: Aluminum or Painted aluminum.
4. Outdoor, Field-Applied Jacket Schedule
   a. Piping, Concealed: PVC, Aluminum or Painted aluminum.
   b. Piping, Exposed: Aluminum or Painted aluminum.

22 11 13 FACILITY WATER DISTRIBUTION PIPING

Part 1 – General

A. Section Includes

1. Water service outside the building.

B. Related Sections

1. 23 09 00: Instrumentation and Control for HVAC

C. Submittals

Note to Design Professional: Require Coordination Drawings.

D. Quality Assurance

1. Quality Standard for Electrical Components, Devices, and Accessories: NFPA 70.
2. Quality Standard for Materials, Installations, Tests, Flushing, and Valve and Hydrant Supervision for Fire-Service-Main Piping: NFPA 24.
3. Quality Standard for Plastic Potable-Water-Service Piping: NSF 14. Include marking "NSF-pw" on piping.
4. Quality Standard for Water-Service Piping and Specialties for Domestic Water: NSF 61.
5. Quality Standard for Fire-Service-Main Products: UL's "Fire Protection Equipment Directory."

Part 2 – Products

A. Materials

1. Underground Water-Service Piping NPS 3/4 to NPS 3
    a. Soft copper tube and copper solder-joint fittings.
2. Underground Water-Service Piping NPS 4 to NPS 8
    a. Ductile-iron, mechanical-joint pipe and fittings.
3. Aboveground and Vault Water-Service Piping NPS 3/4 to NPS 3
    a. Hard copper tube and copper solder-joint fittings.
4. Aboveground and Vault Water-Service Piping NPS 4 to NPS 8
    a. Hard copper tube and copper solder-joint fittings.
    b. Ductile-iron, grooved-end pipe and ductile-iron grooved-end appurtenances.
5. Piping Specialties
    a. Transition fittings.
    b. Tubular-sleeve pipe couplings.
    c. Split-sleeve pipe couplings.
    d. Flexible connectors.
    e. Dielectric fittings.
6. Corrosion-Protection Piping Encasement

a. As required for soil conditions. Verify with geotechnical engineer.

B. Manufactured Units

1. Gate Valves
    a. Cast Iron.
    b. UL/FMG.
    c. Bronze.
2. Check Valves: AWWA.
3. Butterfly Valves: AWWA.
4. Water Meters for sub-metering: Site water meters shall be per local water utility standards. Coordinate with Section 23 09 00 for interface if monitored by EMS system.

Part 3 – Execution

No specific LBUSD requirements.

22 11 16 DOMESTIC WATER PIPING

Part 1 – General

A. Related Sections

1. 22 11 13: Facility Water Distribution Piping

B. Submittals

Note to Design Professional: Include submittal requirement for domestic water piping to meet the lead-free requirements of California HSC section 116875 and to comply with NSF 61.

Part 2 – Products

A. Under-Building-Slab, Domestic Water Piping

1. Pipe NPS 2 and Smaller: ASTM B 88 Type K soft copper tube. No joints allowed.
2. ASTM A 674 or AWWA C105 PE film encasement, 0.004 inch thickness for underground metal piping.

B. Aboveground Domestic Water Piping

1. Pipe NPS 2 through NPS 4: ASTM B 88 Type L hard copper tube; ASTM B16.18 and B16.22 wrought-copper, solder-joint fittings; and brazed joints.

C. Manufactured Units

1. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
2. Flexible Connectors: Bronze or Stainless-steel hose.

Part 3 – Execution

No specific LBUSD requirements.

22 11 19 DOMESTIC WATER PIPING SPECIALTIES

Part 1 – General

A. Section Includes

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated water mixing valves.
6. Strainers.
7. Outlet boxes.
8. Hose stations.
9. Hose bibs.
10. Wall hydrants.
11. Ground hydrants.
12. Drain Valves.
13. Water hammer arrestors.
14. Air vents.
15. Trap-seal primer valves.
16. Trap-seal primer systems.

B. Related Sections

1. 22 05 19: Meters and Gages for Plumbing Piping
2. 22 11 16: Domestic Water Piping

C. Submittals

Note to Design Professional: Include submittal requirement for domestic water piping specialties to meet the lead-free requirements of California HSC section 116875 and to comply with NSF 61.

D. Quality Assurance

1. Quality Standards: NSF 61.

Part 2 – Products

A. Vacuum Breakers

1. Pipe-Applied, Atmospheric-Type Vacuum Breakers: Chrome-plated finish.
2. Hose-Connection Vacuum Breakers: Chrome- or nickel-plated finish.
3. Pressure vacuum breakers.
4. Laboratory-faucet vacuum breakers.
5. Spill-resistant vacuum breakers.

B. Backflow Preventers

1. Acceptable manufacturers:
    a. Basis of design: Febco, a Watts Water Technologies, Inc., Company http://www.wattswater.com/_brands/northAmerica/febco
    b. Wilkins, a Zurn Industries, LLC. Company http://www.zurnwilkins.com/
    c. Or Approved Equal
2. Intermediate Atmospheric-Vent Backflow Preventers:
    a. End Connections: Union, solder joint.
    b. Finish: Chrome plated.
3. Reduced-Pressure-Principle Backflow Preventers:
    a. Body: Bronze for NPS 2 and smaller; steel with interior lining for NPS 2-1/2 and larger.
    b. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
    c. Configuration: As required.
4. Double-Check Backflow-Prevention Assemblies:
    a. Body: Bronze for NPS 2 and smaller; steel with interior lining for NPS 2-1/2 and larger.
    b. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
    c. Configuration: As required.
5. Beverage-dispensing-equipment backflow preventers.
6. Dual-check-valve backflow preventers.
7. Carbonated-beverage-dispenser, dual-check-valve backflow preventers.
8. Hose-connection backflow preventers.
9. Backflow-preventer test kits.

C. Water Pressure-Reducing Valves:
    1. Water Regulators:
        a. Acceptable manufacturers:
            i. Basis of design: Febco, a Watts Water Technologies, Inc., Company http://www.wattswater.com/_brands/northAmerica/febco
            ii. Wilkins, a Zurn Industries, LLC. Company http://www.zurnwilkins.com/
            iii. Or Approved Equal
        b. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron with interior lining for NPS 2-1/2 and NPS 3.
        c. Valves for Booster Heater Water Supply: Include integral bypass.
        d. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

D. Balancing Valves
    1. Copper-Alloy Calibrated Balancing Valves: Ball or Y-pattern globe valve.
    2. Cast-iron calibrated balancing valves.
    3. Accessories: Meter kit.
    4. Memory-stop balancing valves.

E. Temperature-Actuated Water Mixing Valves
    1. Water-Temperature Limiting Devices:
        a. Connections: Threaded union inlets and outlet.
        b. Finish: Chrome plated.

F. Primary, Thermostatic, Water Mixing Valves
    1. Type: Exposed mounted or Cabinet type as required.
    2. Connections: Threaded union inlets and outlet.
    3. Finish: Chrome plated.
    4. Piping: Chrome plated.
    5. Cabinet: Recessed or Surface mounted as required.

G. Manifold, Thermostatic, Water-Mixing-Valve Assemblies
    1. Description: Cabinet-type or Exposed-mounted assembly in two or three-valve parallel arrangement as required.
    2. Cabinet: Recessed or Surface mounted as required.
    3. Finish: Chrome plated.
    4. Piping: Chrome plated.

H. Photographic-process, thermostatic, water-mixing-valve assemblies.

I. Individual-fixture, water tempering valves

1. Acceptable manufacturers for sink and lavatory mixing valves
    a. Basis of design: Bradley Corporation http://www.bradleycorp.com/
    b. No known equal
2. Acceptable manufacturers for shower mixing valves:
    a. Basis of design: Bradley Corporation http://www.bradleycorp.com/
    b. Leonard Valve Company http://leonardvalve.com/
    c. Powers Controls, a Watts Water Technologies, Inc., Company http://www.powerscontrols.com/
    d. Or Approved Equal
3. Primary water tempering valves.

J. Strainers for Domestic Water Piping

1. Body: Bronze for NPS 2 and smaller; cast iron with interior lining and epoxy coating for NPS 2-1/2 and larger.
2. Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
3. Screen: Stainless steel with round perforations unless otherwise indicated.
4. Drain: Factory-installed, hose-end drain valve.

K. Outlet Boxes

1. Clothes Washer Outlet Boxes:
    a. Acceptable manufacturers
        i. Basis of design: IPS Corporation, Guy Gray http://www.ipscorp.com/
        ii. Acorn Engineering Company http://www.acorneng.com/
        iii. Or Approved Equal
    b. Material and Finish: Stainless-steel box and faceplate.
    c. Inlet Hoses: Two, 60 inches long.
    d. Drain Hose: One, 48 inches long.

L. Icemaker Outlet Boxes: Stainless-steel box and faceplate.

1. Acceptable manufacturers
    a. Basis of design: IPS Corporation, Guy Gray http://www.ipscorp.com/
    b. Acorn Engineering Company http://www.acorneng.com/
    c. Or Approved Equal

M. Hose Stations:

1. Single-Temperature-Water Hose Stations:
    a. Body: Bronze with stainless-steel wetted parts.
    b. Finish: Rough bronze or chrome plated.
    c. Mounting: Wall, with reinforcement or Floor, with stainless-steel pedestal.
    d. Hose: Length as required.
2. Hot- and Cold-Water Hose Stations:
    a. Type Faucet: Thermostatic mixing valve.
    b. Body: Bronze with stainless-steel wetted parts.
    c. Finish: Rough bronze or chrome plated.
    d. Mounting: Wall, with reinforcement or Floor, with stainless-steel pedestal.
    e. Hose: Length as required.

N. Hose Bibbs:

1. Acceptable manufacturers
    a. Basis of design: Woodford Manufacturing Company http://www.woodfordmfg.com/woodford/
    b. Zurn Industries, LLC http://www.zurn.com/
    c. Acorn Engineering Company http://www.acorneng.com/
    d. Or Approved Equal
2. Vacuum Breaker: Integral.
3. Finish for Service Areas: Chrome or nickel plated.
4. Operation for Service Areas: Operating key.
5. Operation for Finished Rooms: Operating key.
6. Wall flange with each chrome- or nickel-plated hose bibb.

O. Wall Hydrants

1. Acceptable manufacturers
    a. Basis of design: Woodford Manufacturing Company http://www.woodfordmfg.com/woodford/
    b. Zurn Industries, LLC http://www.zurn.com/
    c. Acorn Engineering Company http://www.acorneng.com/
    d. Or Approved Equal
2. Moderate-Climate Wall Hydrants:

a. Outlet: Exposed.
b. Finish: Polished nickel bronze.

3. Vacuum Breaker Wall Hydrants: Loose key.

P. Ground Hydrants
1. Box: Standard or Deep pattern with cover.
2. Box and Cover Finish: Rough bronze.

Q. Drain Valves: Ball-valve type.

R. Water Hammer Arresters: Metal bellows.
1. Acceptable manufacturers
a. Basis of design: Mifab Manufacturing, Inc. http://www.mifab.com/
b. Precision Plumbing Products http://www.pppinc.net/
c. Or Approved Equal

S. Air Vents: Bolted construction.

T. Trap-Seal Primer Valves: Supply type.
1. Acceptable manufacturers
a. Basis of design: Mifab Manufacturing, Inc. http://www.mifab.com/
b. Precision Plumbing Products http://www.pppinc.net/
c. Or Approved Equal

U. Trap-Seal Primer Systems
1. Cabinet: Recessed- or Surface-mounted steel box with stainless-steel cover.
2. Number Outlets: As required.

Part 3 – Execution

No specific LBUSD requirements.

22 11 23 DOMESTIC WATER PUMPS

Part 1 – General

A. Related Sections
1. 22 11 23.13: Domestic-Water Packaged Booster Pumps

B. Submittals

Note to Design Professional: Include submittal requirement for domestic water pumps to meet the lead-free requirements of California HSC section 116875. Require operation and maintenance data be submitted as well.

C. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. In-Line, Sealless Centrifugal Pumps

1. Acceptable manufacturers
    a. Basis of design: Grundfos http://www.grundfos.com/
    b. Taco, Inc. http://www.taco-hvac.com/
    c. Bell & Gossett http://bell-gossett.com/
    d. Or Approved Equal
2. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type.
3. Casing: Bronze.
4. Impeller: Plastic.
5. Motor: Single speed, unless otherwise indicated.

B. Horizontally Mounted, In-Line, Separately Coupled Centrifugal Pumps

1. Casing Material: Bronze or Cast iron.
2. Impeller Material: Cast bronze or stainless steel.
3. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve.
4. Seal: Mechanical.
5. Bearings: Oil-lubricated; bronze-journal or ball type.
6. Shaft Coupling: Flexible.
    a. Motor: Single speed, with grease-lubricated ball bearings; and resiliently or rigidly mounted to pump casing.

C. Horizontally Mounted, In-Line, Close-Coupled Centrifugal Pumps

1. Casing Material: Bronze or Cast iron.
2. Impeller Material: Cast bronze or stainless steel.
3. Shaft and Shaft Sleeve: Steel shaft with deflector, with copper-alloy shaft sleeve.
4. Seal: Mechanical.
5. Bearings: Oil-lubricated; bronze-journal or ball type.
6. Shaft Coupling: Flexible.

a. Motor: Single speed, with grease-lubricated ball bearings.

D. Vertically Mounted, In-Line, Close-Coupled Centrifugal Pumps

1. Casing Material: Bronze or Cast iron.
2. Impeller Material: Cast bronze or stainless steel.
3. Shaft and Shaft Sleeve: Steel shaft with copper-alloy shaft sleeve.
4. Seal: Mechanical.
5. Bearings: Oil-lubricated; bronze-journal or ball type.
6. Shaft Coupling: Flexible or rigid type if pump is provided with coupling.
7. Motor: Single speed, with grease-lubricated ball bearings; and rigidly mounted to pump casing.

E. Controls

1. Pressure Switches: Electric, adjustable for control of water-supply pump.
   a. Type: Water-immersion pressure sensor, for installation in piping.
   b. Operation of Pump: On or off.
2. Thermostats: Electric; adjustable for control of hot-water circulation pump.
   a. Type: Water-immersion temperature sensor, for installation in piping.
   b. Operation of Pump: On or off.
3. Time-Delay Relays: Electric, for control of hot-water circulation pump between water heater and connected hot-water storage tank.
   a. Type: Adjustable time-delay relay.
   b. Range: Up to five minutes.
   c. Operation of Pump: On or off.

Part 3 – Execution

No specific LBUSD requirements.

22 11 23.13 DOMESTIC WATER PACKAGED BOOSTER PUMPS

Part 1 – General

A. Related Sections

1. 22 11 23: Domestic Water Pumps

B. Submittals

Note to Design Professional: Include submittal requirement for domestic water pumps to meet the lead-free requirements of California HSC section 116875. Require operation and maintenance data be submitted as well.

C. Quality Assurance

1. Quality Standards for Packaged Booster Pumps: UL 508, UL 508A, UL 778, and UL 1995.
2. Booster pumps listed and labeled as packaged pumping systems.

Part 2 – Products

A. Manufactured Units

1. Multiplex, Variable-Speed Booster Pumps

a. Pumps

i. Type: End suction, close coupled, single stage, overhung impeller, centrifugal.

ii. Casing: Radially split; cast iron.

iii. Impeller: Closed, stainless steel.

iv. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve and deflector.

v. Seal: Mechanical.

vi. Orientation: Mounted horizontally or vertically.

b. Pumps

i. Type: In line, single stage, close coupled, overhung impeller, centrifugal.

ii. Casing: Radially split; cast iron.

iii. Impeller: Closed, cast bronze.

iv. Shaft and Shaft Sleeve: Stainless-steel or steel shaft, with copper-alloy shaft sleeve.

1. Seal: Mechanical.
2. Bearing: Grease-lubricated or pre-greased, permanently shielded ball type.

c. Pumps

i. Type: Vertical, in line, multistage, separately coupled, overhung impeller, centrifugal.

ii. Casing: Cast-iron or steel base and stainless-steel chamber.

iii. Impeller: Closed, stainless steel.

iv. Shaft: Stainless steel.

v. Seal: Mechanical.

vi. Bearing: Water-lubricated sleeve type.

d. Motors: Single speed, with grease-lubricated or pre-greased, permanently shielded, ball-type bearings.

e. Piping: Copper tube and copper fittings.

f. Control Logic: Solid-state system with transducers, programmable microprocessor, VFC, and other devices in controller. Install VFC for pump motors larger than 25 hp in separate panel; same type as motor control panel enclosure.

g. Motor Controller: NEMA ICS 2, variable-frequency, solid-state type.

i. Control Voltage: 24 or 120-V ac, with integral control-power transformer.

h. Enclosure: Type 1, Type 3R, Type 4, or Type 12, as required.

i. Motor Overload Protection: Overload relay in each phase.

j. Starting Devices: Hand-off-automatic selector switch for each pump in cover of control panel, plus pilot device for automatic control.

i. Duplex, Automatic, Alternating Starter: Switches lead pump to lag main pump and to two-pump operation.

ii. Triplex, Sequence (Lead-Lag-Lag) Starter: Switches lead pump to one lag main pump and to three-pump operation.

k. VFC: Voltage-source, pulse-width, modulating-frequency converter for each pump.

l. Manual Bypass: Magnetic contactor arranged to transfer to constant-speed operation upon VFC failure.

m. Instrumentation: Suction and discharge pressure gages.

n. Lights: Running light for each pump.

o. Alarm Signal Device: Sounds alarm when backup pumps are operating.

i. Time Delay: Controls alarm operation; adjustable from 1 to 300 seconds, with automatic reset.

p. Thermal-bleed cutoff.

q. Low-suction-pressure cutout.

r. High-suction-pressure cutout.

s. Low-discharge-pressure cutout.

t. High-discharge-pressure cutout.

u. Building Automation System Interface: Auxiliary contacts for building automation system. Verify system type. Include on-off status of each pump and alarm status.

v. Base: Structural steel.

Part 3 – Execution

No specific LBUSD requirements.

22 13 16 SANITARY WASTE AND VENT PIPING

Part 1 – General

A. Related Sections

1. 22 13 13: Facility Sanitary Sewers
2. 22 13 29: Sanitary Sewerage Pumps

Part 2 – Products

A. Materials - Piping Within Building and Outside Below Grade to 5 Feet From Foundation

1. Hubless, ASTM A 888 or CISPI Standard 301 cast-iron soil pipe and CISPI Standard 310, or heavy-duty, shielded hubless piping couplings as required for location. Heavy-duty couplings shall be used in the following locations:
    a. Above ceiling in food preparation, food storage, and dining areas.
    b. Below grade.
2. Basis of Design Product: Anaco model Husky SD-4000 heavy-duty couplings.
3. Acceptable Equal Product(s): Clamp-All 125, Mission Heavyweight, or approved equal.
4. Standard weight, galvanized pipe, with cast-iron drainage fittings may be used for vent piping 2-1/2 inch and smaller, and for drain and waste piping from lavatories, sinks, and drinking fountains.
5. DWV copper tube with solder-joint drainage fittings may be used for vent piping 2-1/2 inch and smaller, and for drain and waste piping from lavatories, sinks, and drinking fountains.
6. ASTM A 674 or AWWA C105 ASTM A 674 or AWWA C105 PE film encasement, 0.004 inch thickness for underground metal piping, as required based on soil conditions.

Part 3 – Execution

Note to Design Professional: Review geotechnical report and consider use of pipe encasement for below-grade piping.

22 14 13 FACILITY STORM DRAINAGE PIPING

Part 1 – General

A. Related Sections

1. 22 14 29: Sump Pumps
2. 33 41 00: Storm Utility Drainage Piping

Part 2 – Products

A. Materials – Piping Within Building and Outside Below Grade to 5 Feet From Foundation:

3. Hubless, ASTM A 888 or CISPI Standard 301 cast-iron soil pipe and heavy-duty, shielded hubless piping couplings.
    a. Basis of Design Product: Anaco model Husky SD-4000 heavy-duty couplings.
    b. Acceptable Equal Product(s): Clamp-All 125, Mission Heavyweight, or approved equal.
4. Shielded, non-pressure transition couplings.
5. ASTM A 674 or AWWA C105 PE-film encasement, 0.004-inch thickness for underground metal piping.

Part 3 – Execution

Note to Design Professional: Review geotechnical report and consider use of pipe encasement for below-grade piping.

22 15 13 GENERAL-SERVICE COMPRESSED-AIR PIPING

Part 1 – General

A. Summary: Piping and related specialties for systems operating at 200 psig or less.

B. Related Sections

1. 22 15 19: General-Service Packaged Air Compressors and Receivers

C. Quality Assurance

1. Quality Standard for High-Pressure Compressed-Air Piping: ASME B31.1.
2. Quality Standard for Low-Pressure Compressed-Air Piping: ASME B31.9.
3. Quality Standard for Brazing: ASME Boiler and Pressure Vessel Code: Section IX or AWS B2.2.
4. Quality Standard for Welding: ASME Boiler and Pressure Vessel Code: Section IX.

Part 2 – Products

A. Products

1. Performance Requirements: Seismic Performance: Per California Building Code (CBC).
2. Dielectric Fittings
    a. Dielectric Unions: 250-psig minimum working pressure at 180 deg F.
    b. Dielectric Flanges: 150- or 300-psig minimum working pressure.
    c. Dielectric-flange kits.
3. Flexible Pipe Connectors: Stainless steel.
4. Quick Couplings: Automatic shutoff.
5. Hose Assemblies
    a. Reinforced double-wire-braid hose.
    b. Stainless-steel hose clamps or bands.
    c. Hose couplings.
    d. Hose splicers.

B. Piping Applications

1. Piping between Air Compressors and Receivers:
    a. NPS 2 and Smaller: Type K copper tube with brazed joints.
2. Low-Pressure Distribution Piping:
    a. Low-Pressure Distribution Piping:
3. Drain Piping: Copper tube with brazed or soldered joints.

Part 3 – Execution

No specific LBUSD requirements.

22 33 00 ELECTRIC, DOMESTIC-WATER HEATERS

Part 1 – General

A. Submittals

1. Product Data: Provide for each type and size of domestic-water heater indicated.

B. Quality Assurance

1. Performance Efficiency: ASHRAE/IESNA 90.1 and ASHRAE 90.2.
2. ASME Compliance: ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

3. Compliance: NSF 61, "Drinking Water System Components - Health Effects."

C. Warranty

Note to Design Professional: Require manufacturer's Materials and Workmanship Warranty on:

- Commercial, Electric, Domestic-Water Heaters
- Electric, Tankless, Domestic-Water Heaters
- Compression Tanks

Part 2 – Products

A. Commercial, Electric, Domestic-Water Heaters:

1. Commercial, Electric, Domestic-Water Booster Heaters:
   a. Tank: Corrosion-resistant metal or steel.
   b. Pressure Rating: 150 psig.
   c. Brackets for undercounter installation or Legs for floor installation.
2. Commercial, Electric, Storage, Domestic-Water Heaters:
   a. Acceptable manufacturers
      i. Basis of design: Bradford White, Inc. http://www.bradfordwhite.com/
      ii. Rheem Manufacturing Company http://www.rheem.com/
      iii. A.O. Smith Water Products Company http://www.aosmith.com/
      iv. Or Approved Equal
   b. Tank: Non-ASME-code, steel.
   c. Horizontal or Vertical arrangement.
   d. Pressure Rating: 150 psig.
3. Commercial, Light-Duty, Storage, Electric, Domestic-Water Heaters: Steel, vertical arrangement with 150-psig pressure rating.
   a. Acceptable manufacturers
      i. Basis of design: Bradford White, Inc. http://www.bradfordwhite.com/
      ii. Rheem Manufacturing Company http://www.rheem.com/
      iii. A.O. Smith Water Products Company http://www.aosmith.com/
      iv. Or Approved Equal

B. Electric, Tankless, Domestic-Water Heaters

1. Acceptable Manufacturers
   a. Chronomite Laboratories, Inc. http://chronomite.com/

b. Eemax, Inc. http://eemaxinc.com/

c. Or Approved Equal

2. Flow-Control, Electric, Tankless, Domestic-Water Heaters:
   a. Copper piping or tubing complying with NSF 61.
   b. Pressure Rating: 150 psig.
   c. High-temperature-limit cutoff device or system.
3. Thermostat-Control, Electric, Tankless, Domestic-Water Heaters:
   a. Copper piping or tubing complying with NSF 61.
   b. Pressure Rating: 150 psig.
   c. High-temperature-limit cutoff device or system.

C. Domestic-Water Heater Accessories:

1. Domestic-Water Expansion Tanks: Steel tank with welded joints and butyl-rubber diaphragm; 150-psig pressure rating.
   a. Acceptable manufacturers
      i. Basis of design: Wilkins, a Zurn Company http://www.zurn.com/
      ii. Watts Water Technologies, Inc. http://www.wattswater.com/
      iii. Powers, a Watts Water Technologies, Inc., Company http://www.powerscontrols.com/
      iv. Or Approved Equal
2. Secondary Drain Pans: Corrosion-resistant metal with raised edge.
3. Piping-type heat traps.
4. Heat-trap fittings.
5. Manifold kits.
6. Pressure-reducing valves.
7. Combination temperature-and-pressure relief valves.
8. Pressure relief valves.
9. Vacuum relief valves.
10. Shock absorbers.
11. Domestic-water heater stands.
12. Domestic-water heater mounting brackets.

Part 3 – Execution

A. Maintain manufacturer's recommended clearances.

B. Arrange units so controls and devices that require servicing are accessible.

22 33 00 ELECTRIC, DOMESTIC-WATER HEATERS

Part 1 – General

D. Submittals

2. Product Data: Provide for each type and size of domestic-water heater indicated.

E. Quality Assurance

4. Performance Efficiency: ASHRAE/IESNA 90.1 and ASHRAE 90.2.
5. ASME Compliance: ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
6. Compliance: NSF 61, "Drinking Water System Components - Health Effects."

F. Warranty

Note to Design Professional: Require manufacturer's Materials and Workmanship Warranty on:

- Commercial, Electric, Domestic-Water Heaters
- Electric, Tankless, Domestic-Water Heaters
- Compression Tanks

Part 2 – Products

D. Commercial, Electric, Domestic-Water Heaters:

4. Commercial, Electric, Domestic-Water Booster Heaters:
   d. Tank: Corrosion-resistant metal or steel.
   e. Pressure Rating: 150 psig.
   f. Brackets for undercounter installation or Legs for floor installation.
5. Commercial, Electric, Storage, Domestic-Water Heaters:
   e. Acceptable manufacturers
      v. Basis of design: Bradford White, Inc. http://www.bradfordwhite.com/
      vi. Rheem Manufacturing Company http://www.rheem.com/
      vii. A.O. Smith Water Products Company http://www.aosmith.com/
      viii. Or Approved Equal
   f. Tank: Non-ASME-code, steel.
   g. Horizontal or Vertical arrangement.

h. Pressure Rating: 150 psig.

6. Commercial, Light-Duty, Storage, Electric, Domestic-Water Heaters: Steel, vertical arrangement with 150-psig pressure rating.

b. Acceptable manufacturers

v. Basis of design: Bradford White, Inc. http://www.bradfordwhite.com/

vi. Rheem Manufacturing Company http://www.rheem.com/

vii. A.O. Smith Water Products Company http://www.aosmith.com/

viii. Or Approved Equal

E. Electric, Tankless, Domestic-Water Heaters

4. Acceptable Manufacturers

d. Chronomite Laboratories, Inc. http://chronomite.com/

e. Eemax, Inc. http://eemaxinc.com/

f. Or Approved Equal

5. Flow-Control, Electric, Tankless, Domestic-Water Heaters:

d. Copper piping or tubing complying with NSF 61.

e. Pressure Rating: 150 psig.

f. High-temperature-limit cutoff device or system.

6. Thermostat-Control, Electric, Tankless, Domestic-Water Heaters:

d. Copper piping or tubing complying with NSF 61.

e. Pressure Rating: 150 psig.

f. High-temperature-limit cutoff device or system.

F. Domestic-Water Heater Accessories:

13. Domestic-Water Expansion Tanks: Steel tank with welded joints and butyl-rubber diaphragm; 150-psig pressure rating.

b. Acceptable manufacturers

v. Basis of design: Wilkins, a Zurn Company http://www.zurn.com/

vi. Watts Water Technologies, Inc. http://www.wattswater.com/

vii. Powers, a Watts Water Technologies, Inc., Company http://www.powerscontrols.com/

viii. Or Approved Equal

14. Secondary Drain Pans: Corrosion-resistant metal with raised edge.

15. Piping-type heat traps.

16. Heat-trap fittings.
17. Manifold kits.
18. Pressure-reducing valves.
19. Combination temperature-and-pressure relief valves.
20. Pressure relief valves.
21. Vacuum relief valves.
22. Shock absorbers.
23. Domestic-water heater stands.
24. Domestic-water heater mounting brackets.

Part 3 – Execution

C. Maintain manufacturer's recommended clearances.

D. Arrange units so controls and devices that require servicing are accessible.

22 34 00 FUEL-FIRED, DOMESTIC-WATER HEATERS

Part 1 – General

A. Submittals

1. Product Data: Provide for each type and size of domestic-water heater indicated.

B. Quality Assurance

1. Performance Efficiency: ASHRAE/IESNA 90.1 and ASHRAE 90.2.
2. ASME Compliance: ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
3. Compliance: NSF 61, "Drinking Water System Components - Health Effects."

C. Warranty

Note to Design Professional: Require manufacturer's Materials and Workmanship Warranty:

- Commercial, Gas-Fired, Domestic-Water Heaters
- Gas-Fired, Tankless, Domestic-Water Heaters
- Compression Tanks

Part 2 – Products

A. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:

1. Commercial, Atmospheric, Power-Burner, and Power-Vent, Gas-Fired, Storage, Domestic-Water Heaters:

a. Acceptable manufacturers
    i. Basis of design: Bradford White, Inc. http://www.bradfordwhite.com/
    ii. Rheem Manufacturing Company http://www.rheem.com/
    iii. A.O. Smith Water Products Company http://www.aosmith.com/
    iv. Or Approved Equal
b. Storage-Tank Construction: Non-ASME-code or ASME code steel as required by code for input MBH rating of heater.
c. Pressure Rating: 150 psig.
d. Lining: Manufacturer's standard tank lining, as needed to meet warranty.
e. Burner: For natural-gas fuel.
f. NSF 5 Construction: Provide NSF 5 Construction for water heaters for food service when required by authorities having jurisdiction.

B. Commercial, Gas-Fired, High-Efficiency, Storage, Domestic-Water Heaters:
    1. Acceptable manufacturers
        a. Basis of design: Bradford White, Inc. http://www.bradfordwhite.com/
        b. Rheem Manufacturing Company http://www.rheem.com/
        c. A.O. Smith Water Products Company http://www.aosmith.com/
        d. Or Approved Equal
    2. Tank: ASME-code steel.
    3. Pressure Rating: 150 psig.
    4. Lining: Manufacturer's standard tank lining.

C. Gas-Fired, Tankless, Domestic-Water Heaters:
    1. Acceptable Manufacturers
        a. Bradford White, Inc. http://www.bradfordwhite.com/
        b. Rinnai America Corporation http://www.rinnai.us/
        c. Takagi Industrial Corporation http://takagi.com/
        d. Or Approved Equal
    2. Construction: Copper piping or tubing.
    3. Pressure Rating: 150 psig.
    4. Burner: For natural-gas fuel.

D. Domestic-Water Heater Accessories

1. Domestic-Water Compression Tanks: Steel tank with welded joints and butyl-rubber diaphragm; 150-psig pressure rating.
    a. Acceptable manufacturers
        i. Basis of design: Wilkins, a Zurn Company http://www.zurn.com/
        ii. Watts Water Technologies, Inc. http://www.wattswater.com/
        iii. Powers, a Watts Water Technologies, Inc., Company http://www.powerscontrols.com/
        iv. Or Approved Equal
2. Secondary Drain Pans: Corrosion-resistant metal with raised edge.
3. Piping-type heat traps.
4. Manifold kits.
5. Gas shutoff valves.
6. Gas pressure regulators.
7. Automatic gas valves.
8. Combination temperature-and-pressure relief valves.
9. Pressure relief valves.
10. Vacuum relief valves.
11. Domestic-water heater stands.
12. Domestic-water heater mounting brackets.

Part 3 – Execution

A. Maintain manufacturer's recommended clearances.

B. Arrange units so controls and devices that require servicing are accessible.

22 35 00 DOMESTIC-WATER HEAT EXCHANGERS

Part 1 – General

A. Submittals

Note to Design Professional: Include submittal requirement for domestic-water heat exchangers to meet the lead-free requirements of California HSC section 116875.

1. Product Data: Provide for each type and size of domestic-water heat exchanger indicated.
2. Shop Drawings.

B. Quality Assurance

1. Performance Efficiency: ASHRAE/IESNA 90.1 and ASHRAE 90.2.
2. ASME Compliance: ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
3. NSF Compliance: NSF 61, "Drinking Water System Components - Health Effects."

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

A. Install domestic-water heat exchangers level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

22 41 00 PLUMBING FIXTURES

Part 1 – General

A. Section Includes

1. Water Closets.
2. Water Closet Flushometer Valves.
3. Toilet Seats.
4. Urinals.
5. Sinks
6. Sink Faucets.
7. Lavatories.
8. Lavatory Faucets.
9. Shower Faucets.
10. Drinking Fountains
11. Disposers.

B. Submittals

Note to Design Professional:

- Include submittal requirement for plumbing fixtures to meet the lead-free **requirements** of California HSC section 116875.
- Coordinate wall requirements with Architect to ensure adequate space for specified carriers.
- Coordinate with architectural interior elevations for mounting heights.

C. Warranty

Note to Design Professional: Require manufacturer's warranties.

Part 2 – Products

A. Wall-Mounted Water Closets

1. Water Closets: Wall mounted, top spud, elongated, accessible, vitreous china. ADA compliant and standard applications.
    a. Acceptable Manufacturers/Products:
        i. Basis of design: Kohler https://www.kohler.com/en
            1. Model K-4325-0 Kingston
        ii. American Standard http://www.americanstandard-us.com/
        iii. Or Approved Equal
    b. Material: Vitreous china.
    c. Type: Siphon jet.
    d. Style: Flushometer valve.
    e. Water Consumption: High Efficiency Type (HET), 1.28 gal. per flush.
    f. Support: Waste-fitting assembly.

Note to Design Professional: Review existing mounting conditions. If existing toilets are floor-mounted and converting to wall mounted is not feasible due to physical or project budget constraints, submit a Variance Request. The standard for floor mounted water closets is the Kohler Highcliff Ultra 96057-0 or Approved Equal.

The standard for early education, including Kindergarten classrooms is the Kohler Primary K-96064-0 (waste and supply should have standard rough-in to allow for flexibility for future change out to standard accessible height water closet.

B. Water Closet Flushometer Valves

1. Lever-Handle, Diaphragm Flushometer Valves
    a. Acceptable Manufacturers/Products
        i. Basis of design: Sloan Valve Company http://www.sloanvalve.com/
            1. Model Royal 111-1.28.
        ii. Kohler http://www.kohler.com/corporate/index.html
            1. Model K-13517
        iii. Or Approved Equal
    b. Style: Exposed.
    c. Consumption: 1.28 gal. per flush.

C. Toilet Seats

1. Acceptable Manufacturers/Products
    a. Basis of design: Olsonite http://www.olsonite.com/
        i. Model 95SSCT
    b. Church Seats http://www.churchseats.com/
        i. Model 255SCC, with 300 series self-sustaining concealed check hinge
    c. Bemis Seats http://www.bemisseats.com/
        i. Model 3155 SS CT
    d. Or Approved Equal
2. Type: Commercial (Heavy duty).
3. Shape: Elongated rim, open front.
4. Hinge: Self-sustaining, check.
5. Seat Cover: Not required.

D. Wall-Hung Urinals

1. Urinals: Wall hung, back outlet, washdown, accessible. ADA compliant and standard applications.
    a. Acceptable Manufacturers/Product
        i. Basis of design: Sloan Valve Company http://www.sloanvalve.com/
            1. Model WEUS-1000.1001-0.13. Model includes flushometer valve.
        ii. Zurn http://www.zurn.com/
            1. Model Z5798.207.00. Model includes flushometer valve.
        iii. Or Approved Equal
    b. Material: Vitreous china.
    c. Type: Washout with extended shields.
    d. Water Consumption: High Efficiency Urinal (HEU), 0.13 gal. per flush.

E. Sinks

1. Classroom Sinks: One bowl, counter mounted, enameled, cast iron. ADA compliant. Bubbler only required at Elementary Classroom Sinks.
    a. Acceptable Manufacturer/Products
        i. Sink
            1. Basis of design: Haws http://www.hawsco.com/

a. Model 4110ADA

2. CECO Sinks http://cecosinks.com/

3. Or Approved Equal

ii. Bubbler

1. Basis of design: Haws http://www.hawsco.com/

a. Model 5054 LF

2. Zurn http://www.zurn.com/

a. Model Z833600-XL

3. Or Approved Equal

b. Overall Dimensions: 24 by 16 inches.

i. Bowl: 14.5 by 14.5 inches.

c. Faucet: Classroom.

d. Bubbler: Lever handle, polished chrome-plated brass drinking faucet with automatic stream regulation.

a.

2. Service Sinks: Enameled, cast iron, floor mounted.

a. Acceptable Manufacturers

i. Basis of design: Kohler http://www.kohler.com/corporate/index.html

1. Model K-6710

ii. American Standard http://www.americanstandard-us.com/

1. Model 7745.811

iii. Or Approved Equal

b. Style: With front apron and raised back.

c. Nominal Size: 28 by 28 inches.

d. Drain: Grid with NPS 3 outlet.

e. Rim Guard: Coated wire.

f. Faucet: Service.

3. Lab (Science Room) Sinks: Epoxy-resin, single bowl, counter mounted.

a. Acceptable Manufacturers

i. Basis of design: Durcon, Inc., http://www.durcon.com/

1. "D" Series.

ii. Total Laboratory Solutions – Insul-Serv Inc., http://www.duratop-epoxy.com/

iii. Or Approved Equal

b. Style: Drop-in.

c. Faucet: Lab.

F. Sink Faucets

1. Sink Faucets –Classroom: Manual type, single-control non-mixing valve. ADA compliant.

a. Acceptable Manufactures

i. Basis of design: Chicago Faucets http://www.chicagofaucets.com/

1. Model 350-317XKABCP

ii. Or Approved Equal

b. Body Type: Single hole.

c. Body Material: Commercial, solid brass.

d. Finish: Polished chrome plate.

e. Maximum Flow Rate: 1.8 gpm.

f. Handle(s): Wrist blade, 4 inches.

g. Mounting Type: Deck, exposed.

h. Spout Type: Rigid/Swing solid brass gooseneck.

i. Vacuum Breaker: Not required for hose outlet.

j. Spout Outlet: Aerator.

2. Sink Faucets – Service: Manual type, two-lever-handle mixing valve.

a. Acceptable Manufacturers

i. Basis of design: Chicago Faucets http://www.chicagofaucets.com/

1. Model 540-LD897SCP

ii. Kohler http://www.kohler.com/corporate/index.html

iii. Moen http://www.moen.com/

iv. Or Approved Equal

b. Body Type: Centerset, Widespread.

c. Body Material: Commercial, solid brass.

d. Finish: Polished chrome plate.

e. Maximum Flow Rate: 1.8 gpm.

f. Handle(s): Lever.

g. Mounting Type: Back/wall, exposed.
h. Spout Type: Rigid, solid brass with wall brace.
i. Vacuum Breaker: Required for hose outlet.
j. Spout Outlet: Hose thread.

3. Sink Faucets – Lab: Manual type, single-control valve. ADA compliant.
   a. Acceptable Manufactures
      i. Basis of design: Chicago Faucets http://www.chicagofaucets.com/
         1. Model 928-317XKCP.
      ii. Moen http://www.moen.com/
         1. Model 8106
      iii. Or Approved Equal
   b. Body Type: Single hole.
   c. Body Material: Commercial, solid brass.
   d. Finish: Polished chrome plate.
   e. Handle(s): Wrist blade, 4 inches.
   f. Mounting Type: Deck, exposed.
   g. Spout Type: Rigid, solid brass, with serrated hose nozzle.
   h. Vacuum Breaker: Required for serrated hose outlet.
   i. Spout Outlet: serrated hose type.

G. Enameled, Cast-Iron, Wall-Mounted Lavatories
   1. Lavatory: Rectangular, concealed front overflow, enameled, cast iron, ADA compliant.
      a. Acceptable Manufacturer
         i. Basis of design: CECO Sinks http://cecosinks.com/\
            1. Model: 551-1
         ii. Basis of design: Kohler http://www.kohler.com/corporate/index.html
            1. Model K-2867-0 Hudson
         iii. Or Approved Equal
      b. Faucet-Hole Punching: Three holes, 2-inch centers.
      c. Faucet-Hole Location: Top.
      d. Faucet: Student, Student Cafeteria, or Staff.

H. Solid-Brass, Manually Operated Lavatory Faucets

1. Lavatory Faucets – Student: Manual–type, single-control non-mixing, commercial, solid-brass valve.
    a. Acceptable Manufacturers
        i. Basis of design: Chicago Faucets http://www.chicagofaucets.com/
            1. Model 3400-ABCP.
        ii. or Approved Equal
    b. Body Type: Centerset.
    c. Body Material: Commercial, solid brass.
    d. Finish: Polished chrome plate.
    e. Maximum Flow Rate: 0.5 gpm.
    f. Maximum Flow: 0.20 gal. per metering cycle.
    g. Mounting Type: Deck, exposed.
    h. Valve Handle(s): Push button.
    i. Spout: Rigid type.
    j. Spout Outlet: Aerator.
    k. Drain: Not part of faucet.
2. Lavatory Faucets – Student Cafeteria: Manual–type, single-control mixing, commercial, solid-brass valve.
    a. Acceptable Manufacturers
        i. Basis of design: Chicago Faucets http://www.chicagofaucets.com/
            1. Model 3300-ABCP.
        ii. No known equal.
    b. Body Type: Centerset.
    c. Body Material: Commercial, solid brass.
    d. Finish: Polished chrome plate.
    e. Maximum Flow Rate: 0.5 gpm.
    f. Maximum Flow: 0.25 gal. per metering cycle.
    g. Mounting Type: Deck, exposed.
    h. Valve Handle(s): Push button.
    i. Spout: Rigid type.
    j. Spout Outlet: Aerator.
    k. Drain: Not part of faucet.

3. Lavatory Faucets – Staff: Manual–type, single-control mixing, commercial, solid-brass valve.
    a. Acceptable Manufacturers
        i. Basis of design: Chicago Faucets http://www.chicagofaucets.com/
            1. Model 2200-4E2805ABCP.
        ii. Symmons http://www.symmons.com/
        iii. Or Approved Equal
    b. Body Type: Centerset.
    c. Body Material: Commercial, solid brass.
    d. Finish: Polished chrome plate.
    e. Maximum Flow Rate: 0.5 gpm.
    f. Mounting Type: Deck, exposed.
    g. Valve Handle(s): Single lever.
    h. Spout: Rigid type.
    i. Spout Outlet: Aerator.
    j. Drain: Not part of faucet.

I. Shower Faucets
1. Shower Faucets – Student: Single–handle, pressure-balance mixing valve with hot- and cold-water indicators, check stops, shower head, and hand-held spray unit. ADA Compliant.
    a. Acceptable Manufacturers
        i. Basis of design: Bradley Corporation http://www.bradleycorp.com/
            1. Model 1C
        ii. Leonard Valve Company http://leonardvalve.com/
        iii. Powers Controls, a Watts Water Technologies, Inc., Company http://www.powerscontrols.com/
        iv. Or Approved Equal
    b. Body Material: Polished chrome plate, solid brass.
    c. Maximum Flow Rate: 2.0 gpm.
    d. Mounting: Concealed.
    e. Operation: 24V push-button electronic metering control with 60 second metering cycle. Provide manufacturer's Class 2 transformer.
    f. Antiscald Device: Integral with mixing valve.

g. Shower Head: Lockable ball joint with arm and flange.

h. Shower-Arm, Flow-Control Fitting: 2.0 gpm.

2. Shower Faucets – Staff: Single–handle, pressure-balance mixing valve with hot- and cold-water indicators, check stops, shower head, and hand-held spray unit. ADA compliant.]

a. Acceptable Manufacturers

i. Basis of design: Bradley Corporation http://www.bradleycorp.com/

1. Model HN300

ii. Leonard Valve Company http://leonardvalve.com/

iii. Powers Controls, a Watts Water Technologies, Inc., Company http://www.powerscontrols.com/

iv. Or Approved Equal

b. Body Material: Polished chrome plate, solid brass.

c. Maximum Flow Rate: 2.0 gpm.

d. Mounting: Concealed.

e. Operation: Single-handle, twist or rotate control.

f. Antiscald Device: Integral with mixing valve.

g. Shower Head: lockable ball joint with arm and flange.

h. Hand-held Shower Spray: Quick-disconnect hose with vacuum breaker and mounting bracket. Provide in-wall diverter valve.

i. Shower-Arm, Flow-Control Fitting: 2.0 gpm.

J. Drinking Fountains & Bottle Filling Stations

1. Drinking Fountains:

a. Acceptable Manufacturers

i. Basis of design: Haws http://www.hawsco.com/

1. Model 1117LN

ii. Elkay Companies http://elkay.com/

1. Model EHWM217RAC

iii. Or Approved Equal

b. Mount: Wall

c. Finish: 14-gauge Type 304 stainless steel

d. Type Receptor: Wall

e. Receptor Shape: Rectangular.

f. Back Panel: Stainless-steel wall plate behind drinking fountain.

g. Bubblers: Two, with adjustable stream regulator, located on deck.

h. Control: Push button.

a. Filter: Filter: Must be filter ready, total station to accommodate 3,000-gallon capacity filter; In-line, inlet/outlet head assembly and bypass plug to be installed within In-Wall and Recessed Filter Access Panel.

i. Access panel size: 16” x 16”

j. Hose Bib: Confirm existing conditions, review if necessary for both interior and exterior applications.

k. Water Hammer Arrestor: Yes

l. Cleanout: Yes, Provide one per fixture or pair assembly

m. Drain: Grid.

n. Mounting Plate: In-wall mounting plate

o. Support: Coordinate Carrier for In-Wall Wall Mount or In-Wall Floor Mounted

2. Bottle Filling Stations:

b. Acceptable Manufacturers

i. Basis of design: Haws http://www.hawsco.com/

A. Model 1920

i. Requires a mounting plate; either 6700 in-wall or 6700R on wall support plate

ii. Elkay Companies http://elkay.com/

A. Models ezH2O EMASM, LZLMNSSM (stainless steel pending)

ii. Or Approved Equal

c. Location: Confirm appropriate model for indoor and outdoor installations

d. Mount: Wall

e. Finish: Stainless Steel

f. Back Panel: Stainless steel wall plate behind bottle filler

g. Control: Push button

h. Electrical: No Electrical nor Battery Required

i. Bottle Stand: Coordinate Bottle Stand to allow positive drainage and meet ADA requirements.

j. Filter: Must be filter ready, total station to accommodate 3,000-gallon capacity filter

3. Drinking Fountain and Bottle Filling Combo Stations:
    a. Coordinate options for single, single with bottle filling stations, dual, dual with bottle filling station, and bottle filling station standalone based on Volume 1 Design Guidelines and existing site conditions
4. Exterior Free Standing, ADA Compliant. For use in exterior applications such as playfields, sports fields or where no exterior wall space is available.
        i. Acceptable Manufacturers
        ii. Basis of design: Elkay Companies http://elkay.com/
            A. Model LK4430BF1U
        iii. Haws http://www.hawsco.com/
            A. Model 3612F
        iv. Or Approved Equal
        v. Mount: Floor Mount/Freestanding
        vi. Bubblers: Vandal resistant, two bubblers, hi-low, plus bottle filling station
        vii. Control: Push button
        viii. Features: 316 Stainless, Heavy Duty Vandal Resistant, Laminar Flow
        ix. Electrical: no electrical nor batteries required

K. Disposers
1. Disposers: Continuous-feed household, food waste.
    a. Acceptable Manufacturers
        i. Basis of design: Emerson Electric Company http://www.emerson.com/en-US/Pages/default.aspx
            1. Model InSink Erator Evolution Essential
        ii. KitchenAid http://www.kitchenaid.com/
            1. Model Superba
        iii. Or Approved Equal
    b. Standards: ASSE 1008 and UL 430, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
    c. General: Include reset button; wall switch; corrosion-resistant chamber with jam-resistant, cutlery- or stainless-steel grinder or shredder; NPS 1-1/2 outlet; quick-mounting, stainless-steel sink flange; antisplash guard; and combination cover/stopper.
    d. Model: Sound-insulated chamber.
    e. Motor: 115-V ac, 1725 rpm, 3/4 hp with overload protection.

L. Emergency Eyewash and Shower Stations

1. Science Lab Classrooms

a. Acceptable Manufacturers:

i. Basis of Design: WaterSaver

ii. Haws

iii. Bradley

iv. Guardian

v. Or Approved Equal

b. Model: WaterSaver Model SSBF2150, Recessed Safety Station with Secondary Drain Pan and Exposed Shower Head, ADA compliant, 16 ga. stainless steel, individually adjustable flow control at each spray head, and filter to remove impurities.

Part 3 – Execution

No specific LBUSD requirements.

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

23 05 48 VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

Part 1 – General

A. Related Sections

1. 21 05 48: Vibration and Seismic Controls for Fire Suppression
2. 22 05 48: Vibration and Seismic Controls for Plumbing

B. Submittals

Note to Design Professional: Include requirement for Coordination Drawings for vibration isolation device installation and seismic bracing for plumbing piping and equipment, including other supports and restraints.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

Note to Design Professional:

- Coordinate with Project structural engineer relative to seismic controls.
- Provide documentation in plans and specifications required to obtain DSA approval and convey scope of seismic controls for Project to Contractor.
- Coordinate vibration controls with acoustical consultant if part of Project team.

A. Components

1. Vibration Isolators
    a. Suitable for application.
2. Restrained Vibration Isolation Roof-Curb Rails: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail; with spring isolators mounted on elastomeric isolation pads, and snubber bushings. For use with roof-mounted air-handlers and HVAC units.
3. Vibration Isolation Equipment Bases
    a. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.
    b. Inertia Base: Factory-fabricated, welded, structural-steel bases and rails ready for field-applied, cast-in-place concrete.
4. Seismic-Restraint Devices
    a. Snubbers: Welded structural-steel shapes and replaceable resilient isolation washers and bushings.
    b. Channel Support System: MFMA-3 slotted steel channels.
    c. Restraint Cables: Galvanized- steel cables.
    d. Anchor Bolts: Mechanical type, seismic rated.
    e. Resilient Isolation Washers and Bushings: Molded neoprene.

Note to Design Professional:

- Use of Dura-Blok rooftop supports, by Eaton, and similar supports are allowed.
- Request District Variance Request prior to specifying rooftop supports made of wood.

Part 3 – Execution

A. Installation

Note to Design Professional: Coordinate all attachments to building structure with Project structural engineer.

1. All seismic restraint devices shall be installed in accordance with their listings.
2. Use vibration isolation, concrete pads and insulated and flexible ducts.

23 05 53 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

Part 1 – General

A. Quality Assurance

1. Quality Standard for Piping Identification: ASME A13.1.

Part 2 – Products

A. Equipment Labels: Metal

B. Plumbing: Premium-grade thermoplastic

C. Warning Signs and Labels: 1/8 inch thick plastic with fasteners.

D. Pipe Labels: Pre-tensioned.

E. Duct Labels: 1/8 inch thick with fasteners or adhesive.

F. Stencils: Fiberboard or metal.

G. Valve Tags: Brass, 0.032-inch minimum thickness.

H. Warning Tags: Approximately 4 by 7 inches; brass grommet and wire fasteners.

I. Ceiling Labels: Self-adhesive clear or colored plastic labels

Part 3 – Execution

A. Equipment Label Installation: Install or permanently fasten labels on each major item of mechanical equipment. Locate equipment labels where accessible and visible.

B. Plumbing Label Installation: Install on or near water distribution location, with directional arrows to identify the flow direction for each loop per room. Label must identify hot or chilled water.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

C. Provide identification markers to locate air conditioning equipment and associated filters above T-bar ceilings. Install 3/4 inch to one inch diameter-colored self-adhesive dots to T-bar ceiling grid

indicating point of access. Install 3/8 inch to one inch a clear plastic label with black numbers indicating number and size of filters. The following identification markers shall also be recorded on the project record documents:

1. Fire Damper and Combination Fire/Smoke Fire Damper: Red.
2. Manual Volume Dampers, Relief Dampers, Motorized Volume Dampers: Blue.
    a. Supply air: Full dot.
    b. Return air: Half dot.
3. Fan coil unit: Green.
4. Filter Location if separate from fan coil: Yellow.
5. Filter Type, Size and Quantity: clear with black numbers.

23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC

Part 1 – General

A. Summary

1. Air systems.
2. Hydronic systems.
3. Steam systems.
4. Heat exchangers.
5. Motors.
6. Chillers.
7. Cooling towers.
8. Condensing units.
9. Boilers.
10. Heat-transfer coils.
11. Existing systems: Balance entire system.
12. VRF

B. Submittals

Note to Design Professional: Require contractor to provide:

- Qualification Data: For Testing, Adjusting, and Balancing (TAB) team members.
- Contract Documents Examination Report.

- Certified TAB Reports.
- Instrument calibration reports.

C. Quality Assurance

1. Testing, Adjusting, and Balancing Agent Qualifications: AABC, NEBB, or TABB certified.

D. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

A. Tolerances: Plus or minus 10 percent of design values.

B. Inspections: Random checks by Architect to verify final testing, adjusting, and balancing report.

C. Additional Tests: Random tests within 90 days of completing TAB to verify balance conditions and seasonal tests.

23 07 13 DUCT INSULATION

Part 1 – General

A. Related Sections

1. 23 07 16: HVAC Equipment Insulation
2. 23 07 19: HVAC Piping Insulation
3. 23 31 13: Metal Ducts

B. Submittals

1. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).
2. Product Data for California Green Building Standards Code Compliance: For adhesives and sealants, including primers, documentation of compliance including printed statement of VOC content and chemical components.
3. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Quality Assurance

1. Surface-Burning Characteristics: Flame-spread index of 25, and smoke-developed index of 50 for insulation installed indoors. Flame-spread index of 75, and smoke-developed index of 150 for insulation installed outdoors; according to ASTM E 84.
2. Comply with California Energy Code.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

A. Duct Insulation Schedule, General

1. Plenums and Ducts Requiring Insulation
    a. Indoor, concealed supply and outdoor air.
    b. Indoor, exposed supply and outdoor air.
    c. Indoor, concealed return located in unconditioned space.
    d. Indoor, exposed return located in unconditioned space.
    e. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
    f. Indoor, exposed, Type I, commercial, kitchen hood exhaust.
    g. Indoor, concealed oven and warewash exhaust.
    h. Indoor, exposed oven and warewash exhaust.
    i. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
    j. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
    k. Outdoor, concealed supply and return.
    l. Outdoor, exposed supply and return.
2. Items Not Insulated
    a. Fibrous-glass ducts.
    b. Metal ducts with duct liner of sufficient thickness to comply with California Energy Code.
    c. Factory-insulated flexible ducts.
    d. Factory-insulated plenums and casings.
    e. Flexible connectors.
    f. Vibration-control devices.

g. Factory-insulated access panels and doors.

B. Indoor Duct And Plenum Insulation Schedule:

1. Concealed, Round and Flat-Oval, Supply-Air Duct Insulation: mineral-fiber blanket or mineral-fiber board.
2. Concealed, Round and Flat-Oval, Return-Air Duct Insulation: mineral-fiber blanket or mineral-fiber board.
3. Concealed, Rectangular, Supply-Air Duct Insulation: mineral-fiber blanket or mineral-fiber board.
4. Concealed, Rectangular, Return-Air Duct Insulation: mineral-fiber blanket or mineral-fiber board.
5. Concealed, Rectangular, Outdoor-Air Duct Insulation: mineral-fiber blanket mineral-fiber board.
6. Concealed, Rectangular, Exhaust-Air Duct Insulation between Isolation Damper and Penetration of Building Exterior: mineral-fiber blanket or mineral-fiber board.
7. Concealed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket or board; thickness as required to achieve 2-hour fire rating.
8. Concealed, Supply-Air Plenum Insulation: Mineral-fiber blanket or mineral-fiber board.
9. Concealed, Return-Air Plenum Insulation: Mineral-fiber blanket or mineral-fiber board.
10. Concealed, Outdoor-Air Plenum Insulation: Mineral-fiber blanket or mineral-fiber board.
11. Exposed supply and return ducts shall be internally insulated with 1-inch acoustic lining.

C. Aboveground, Outdoor Duct and Plenum Insulation Schedule:

1. Concealed, Round and Flat-Oval, Supply-Air Duct Insulation: Mineral-fiber blanket or mineral-fiber board.
    a. Concealed, Round and Flat-Oval, Return-Air Duct Insulation: Mineral-fiber blanket or mineral-fiber board.
2. Concealed, Rectangular, Supply-Air Duct Insulation: Mineral-fiber blanket or mineral-fiber board.
3. Concealed, Rectangular, Return-Air Duct Insulation: Mineral-fiber blanket or mineral-fiber board.
4. Concealed, Supply-Air Plenum Insulation: Mineral-fiber blanket or mineral-fiber board.
5. Concealed, Return-Air Plenum Insulation: Mineral-fiber blanket or mineral-fiber board.
6. Exposed, Round and Flat-Oval, Supply-Air Duct Insulation: Mineral-fiber blanket or mineral-fiber board.
7. Exposed, Round and Flat-Oval, Return-Air Duct Insulation: Mineral-fiber blanket or mineral-fiber board.

8. Exposed, Rectangular, Supply-Air Duct Insulation: Mineral-fiber blanket or mineral-fiber board.
9. Exposed, Rectangular, Return-Air Duct Insulation: Mineral-fiber blanket or mineral-fiber board.
10. Exposed, Supply-Air Plenum Insulation: Mineral-fiber blanket or mineral-fiber board.
11. Exposed, Return-Air Plenum Insulation: Mineral-fiber blanket or mineral-fiber board.

D. Indoor, Field-Applied Jacket Schedule:

1. Ducts and Plenums, Concealed: None.
2. Ducts and Plenums, Exposed: PVC, Aluminum, or Painted aluminum.

E. Outdoor, Field-Applied Jacket Schedule:

1. Ducts and Plenums, Concealed: Aluminum, Painted aluminum, or Stainless steel.
2. Ducts and Plenums, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches: Aluminum, Painted aluminum, or Stainless steel.
3. Ducts and Plenums, Exposed, Larger than 48 Inches in Diameter or with Flat Surfaces Larger than 72 Inches: Aluminum or Painted aluminum.

23 07 16 HVAC EQUIPMENT INSULATION

Part 1 – General

A. Related Sections

1. 23 07 13: Duct Insulation
2. 23 07 19: HVAC Piping Insulation

B. Submittals

1. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).
2. Product Data for California Green Building Standards Code Compliance: For adhesives and sealants, including primers, documentation of compliance including printed statement of VOC content and chemical components.
3. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Quality Assurance

1. Surface-Burning Characteristics: Flame-spread index of 25, and smoke-developed index of 50 for insulation installed indoors. Flame-spread index of 75, and smoke-developed index of 150 for insulation installed outdoors; according to ASTM E 84.

2. Comply with California Energy Code.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

A. Breeching Insulation Schedule

1. Round, Exposed Breeching and Connector Insulation: Calcium silicate, high-temperature mineral-fiber blanket, or high-temperature mineral-fiber board.
2. Round, Concealed Breeching and Connector Insulation: Calcium silicate, high-temperature mineral-fiber blanket, or high-temperature mineral-fiber board.
3. Rectangular, Exposed Breeching and Connector Insulation: Calcium silicate, high-temperature mineral-fiber blanket, or high-temperature mineral-fiber board.
4. Rectangular, Concealed Breeching and Connector Insulation: Calcium silicate, high-temperature mineral-fiber blanket, or high-temperature mineral-fiber board.

B. Equipment Insulation Schedule

1. Chillers: Cellular glass, flexible elastomeric, mineral-fiber board, or mineral-fiber pipe and tank.
2. Heat-Exchanger (Water-to-Water for Cooling Service) Insulation: Cellular glass, flexible elastomeric, mineral-fiber board, or mineral-fiber pipe and tank.
3. Heat-Exchanger (Water-to-Water for Heating Service) Insulation: Calcium silicate, cellular glass, mineral-fiber board, or mineral-fiber pipe and tank.
4. Steam-to-Hot-Water Converter Insulation: Calcium silicate, cellular glass, mineral-fiber board, or mineral-fiber pipe and tank.
5. Hot-Water-to-Steam Converter Insulation: Calcium silicate, cellular glass, mineral-fiber board, or mineral-fiber pipe and tank.
6. Chilled-Water Pump Insulation: Cellular glass or mineral-fiber board.
7. Condenser-Water Pump Insulation: Cellular glass or mineral-fiber board.
8. Heating-Hot-Water Pump Insulation: Calcium silicate cellular glass or mineral-fiber board.
9. Heat-Recovery Pump Insulation: Cellular glass or mineral-fiber board.
10. Steam Condensate Pump and Boiler Feedwater Pump Insulation: Calcium silicate, cellular glass, mineral-fiber board, or mineral-fiber pipe and tank.
11. Chilled-Water Expansion/Compression Tank Insulation: Cellular glass, flexible elastomeric, mineral-fiber board, or mineral-fiber pipe and tank.
12. Condenser-Water Expansion/Compression Tank Insulation: Cellular glass, flexible elastomeric, mineral-fiber board, or mineral-fiber pipe and tank.

13. Heating-Hot-Water Expansion/Compression Tank Insulation: Calcium silicate, cellular glass, mineral-fiber board, or mineral-fiber pipe and tank.
14. Heat-Recovery Expansion/Compression Tank Insulation: Cellular glass, flexible elastomeric, mineral-fiber board, or mineral-fiber pipe and tank.
15. Chilled-Water Air-Separator Insulation: Cellular glass, flexible elastomeric, mineral-fiber board, mineral-fiber pipe and tank.
16. Condenser-Water Air-Separator Insulation: Cellular glass, flexible elastomeric, mineral-fiber board, or mineral-fiber pipe and tank.
17. Heating-Hot-Water Air-Separator Insulation: Calcium silicate, cellular glass, mineral-fiber board, or mineral-fiber pipe and tank.
18. Heat-Recovery Air-Separator Insulation: Cellular glass, flexible elastomeric, mineral-fiber board, or mineral-fiber pipe and tank.

C. Indoor, Field-Applied Jacket Schedule

1. Equipment, Concealed: PVC, Aluminum, or Painted aluminum.
2. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches: PVC, Aluminum, or Painted aluminum.
3. Equipment, Exposed, Larger than 48 Inches in Diameter or with Flat Surfaces Larger than 72 Inches: Aluminum or Painted aluminum.

D. Outdoor, Field-Applied Jacket Schedule

1. Equipment, Concealed: PVC, Aluminum, or Painted aluminum.
2. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches: Painted aluminum.
3. Equipment, Exposed, Larger than 48 Inches in Diameter or with Flat Surfaces Larger than 72 Inches: Painted aluminum.

23 07 19 HVAC PIPING INSULATION

Part 1 – General

A. Related Sections

1. 23 07 13: Duct Insulation
2. 23 07 16: HVAC Equipment Insulation

B. Submittals

1. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

2. Product Data for California Green Building Standards Code Compliance: For adhesives and sealants, including primers, documentation of compliance including printed statement of VOC content and chemical components.
3. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Quality Assurance

1. Surface-Burning Characteristics: Flame-spread index of 25, and smoke-developed index of 50 for insulation installed indoors. Flame-spread index of 75, and smoke-developed index of 150 for insulation installed outdoors; according to ASTM E 84.
2. Comply with the requirements from the most recent California Energy Code and Title 24, Section 120.3.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

A. Piping Insulation Schedule, General

1. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
    a. Underground piping.

B. Indoor Piping Insulation Schedule

1. Condensate and Equipment Drain Water below 60 Deg F: Cellular glass, flexible elastomeric, or mineral-fiber, preformed pipe insulation, Type I.
2. Chilled Water and Brine, 40 Deg F and Below: Cellular glass, mineral-fiber, preformed pipe, Type I or mineral fiber, pipe insulation wicking system.
3. Chilled Water and Brine, above 40 Deg F: Cellular glass, mineral-fiber, preformed pipe, Type I or mineral fiber, pipe insulation wicking system.
4. Condenser-Water Supply and Return: Cellular glass or mineral-fiber, preformed pipe, Type I.
5. Heating-Hot-Water Supply and Return, 200 Deg F and Below: Cellular glass or mineral-fiber, preformed pipe, Type I.
6. Heating-Hot-Water Supply and Return, above 200 Deg F: Calcium silicate cellular glass or mineral-fiber, preformed pipe, Type I or II.
7. Refrigerant Suction and Hot-Gas Piping: Cellular glass, flexible elastomeric, or mineral-fiber, preformed pipe, Type I. Insulate refrigerant liquid lines where indicated by unit manufacturer.

8. Heat-Recovery Piping: Cellular glass, flexible elastomeric, or mineral-fiber, preformed pipe insulation, Type I.

C. Outdoor, Aboveground Piping Insulation Schedule

1. Chilled Water and Brine: Cellular glass, flexible elastomeric, or mineral-fiber, preformed pipe insulation, Type I.
2. Condenser-Water Supply and Return: Cellular glass, flexible elastomeric, or mineral-fiber, preformed pipe insulation, Type I.
3. Heating-Hot-Water Supply and Return, 200 Deg F and Below: Cellular glass or mineral-fiber, preformed pipe insulation, Type I.
4. Heating-Hot-Water Supply and Return, above 200 Deg F: Calcium silicate cellular glass or mineral-fiber, preformed pipe insulation, Type I or II.
5. Refrigerant Suction and Hot-Gas Piping: Cellular glass, flexible elastomeric, or mineral-fiber, preformed pipe insulation, Type I. Insulate refrigerant liquid lines where indicated by unit manufacturer.
6. Heat-Recovery Piping: Cellular glass, flexible elastomeric, or mineral-fiber, preformed pipe insulation, Type I.

D. Outdoor, Underground Piping Insulation Schedule

1. Use cased, pre-insulated system with non-metallic outer casing. Installation shall be in strict compliance with manufacturer's instructions and final acceptance shall require certification from manufacturer.

E. Indoor, Field-Applied Jacket Schedule

1. Piping, Concealed: None.
2. Piping, Exposed: PVC, color-coded by system, Aluminum, or Painted aluminum.

F. Outdoor, Field-Applied Jacket Schedule:

1. Piping, Concealed: Aluminum or Painted aluminum.
2. Piping, Exposed: Aluminum or Painted aluminum.

23 11 23 FACILITY NATURAL-GAS PIPING

Part 1 – General

A. Summary

1. Natural-gas piping within the building and distribution on the Project site.
2. Verify guaranteed pressure provided by utility company before designing distribution system.
3. Coordinate service and meter location with utility company.

B. Performance Requirements

1. Minimum Operating-Pressure Ratings:
    a. Piping and Valves: 100 psig.
    b. Service Regulators: as required.
    c. Service Meters: as required.

Part 2 – Products

Note to Design Professional: Provide shut-off valves outside each building and secure from vandalism.

A. Materials

1. Piping Specialties:
    a. Appliance flexible connectors.
    b. Quick-disconnect devices.
    c. Y-Pattern strainers.
    d. Weatherproof vent cap.
2. Manual Gas Shutoff Valves:
    a. Two-piece, full -port bronze ball valves with bronze trim.
    b. Bronze plug valves.
    c. Cast-iron, nonlubricated and lubricated plug valves.
    d. PE ball valves.
    e. Valve boxes.
3. Earthquake Valves: ASCE 25-06 compliant, cast-aluminum body with nickel-plated chrome steel or stainless-steel internal parts. State of California approved.
    a. Acceptable Manufacturers / Products:
        i. Little Firefighter Corporation, models NAGV, VAGV, and AGV http://littlefirefighter.com/
        ii. Seismic Safety Products, LLC, Northridge series http://www.seismic-safety.com/
        iii. Or Approved Equal
4. Pressure Regulators
    a. Service pressure regulators.
    b. Line pressure regulators.
    c. Appliance pressure regulators.
    d. Acceptable Manufacturers

i. American Meter Company http://www.americanmetercompany.nl/

ii. Emerson Process Management: Fisher Regulators http://www2.emersonprocess.com/en-US/Pages/Home.aspx

iii. Actaris http://www.teco-inc.com/site315.php

iv. Or Approved Equal

5. Service Meters: Furnished by natural-gas supplier.
6. Dielectric Fittings: Dielectric unions and dielectric flanges.
7. Detectable tracer wire and warning tape for underground piping.

Part 3 – Execution

A. Piping Schedule

1. Underground Piping After Meter (District side): SDR-11 PE 2406 pipe with heat-fusion joints.
2. Concealed Aboveground Piping: ASTM A 53 Schedule 40 black steel pipe with threaded joints.
3. Exposed Aboveground Piping: ASTM A 53 Schedule 40 galvanized steel pipe with threaded joints, painted with rustproof coating.
4. Containment Conduit: Steel pipe with welded joints.

23 21 13 HYDRONIC PIPING

Part 1 – General

A. Submittals

1. Product Data: For each type of product indicated.
2. Coordination Drawings.
3. Welding Certificates.
4. Engineered expansion control system, including guides, loops, or compensators and anchors.

B. Quality Assurance: Quality Standard: ASME B31.9.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

Note to Design Professional: Consult with soils engineer regarding the need for cathodic protection system for direct-buried and direct-buried cased piping.

A. Piping Applications

1. Hot-water heating piping, aboveground, NPS 2 and smaller, shall be the following:
    a. Type L drawn-temper copper tubing, wrought-copper fittings, and brazed joints.
2. Hot-water heating piping, aboveground, NPS 2-1/2 and larger, shall be any of the following:
    a. Schedule 40 steel pipe, wrought-steel fittings and wrought cast or forged-steel flanges and flange fittings, and welded and flanged joints.
    b. Steel pipe and grooved, mechanical joints.
3. Hot-water heating piping installed belowground and within slabs shall be the following:
    a. Type K soft copper tubing and brazed joints. Use the fewest possible joints.
4. Chilled-water piping, aboveground, NPS 2 and smaller, shall be the following:
    a. Type L drawn-temper copper tubing, wrought-copper fittings, and brazed joints.
5. Chilled-water piping, aboveground, NPS 2-1/2 and larger, shall be any of the following:
    a. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
    b. Steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.
6. Chilled-water piping installed belowground shall be the following:
    a. Pre-insulated cased piping system with steel or copper carrier pipe and insulation, with outer non-metallic casing. Refer also to Section 23 07 19.
7. Condenser-water piping, aboveground, NPS 2 and smaller, shall be the following:
    a. Schedule 40 steel pipe; cast-iron fittings; cast-iron flanges and flange fittings; and threaded joints.
8. Condenser-water piping, aboveground, NPS 2-1/2 and larger, shall be any of the following:
    a. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
    b. Steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.
9. Condenser-water piping installed belowground shall be the following:

a. Type K soft copper tubing, wrought-copper fittings, and soldered joints. Use the fewest possible joints.

10. Makeup-water piping installed aboveground shall be the following:
    a. Type L drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
11. Makeup-Water Piping Installed Belowground and within Slabs: Type K annealed-temper copper tubing, wrought-copper fittings, and soldered joints. Use the fewest possible joints.
12. Condensate-Drain Piping: Type M copper tubing, wrought-copper fittings, and soldered joints.
13. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.
14. Air-Vent Piping
    a. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.
    b. Outlet: Copper tubing with soldered or flared joints.
15. Safety-Valve-Inlet and Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

23 21 16 HYDRONIC PIPING SPECIALTIES

Part 1 – General

A. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Valves

1. Balancing Valves
    a. Bronze, Calibrated-Orifice, Balancing Valves: Ball or plug type with calibrated orifice or venturi.
    b. Cast-Iron or Steel, Calibrated-Orifice, Balancing Valves: Ball, plug, or globe pattern with calibrated orifice or venturi.
        i. Calibrated-orifice, pressure-independent balancing valves may be utilized.
2. Pressure-Reducing Valves: ASME labeled bronze or brass, with glass and carbon-filled PTFE disc and brass seat.

3. Safety Valves: ASME labeled bronze or brass, with glass and carbon-filled PTFE disc and brass seat.
4. Automatic Flow-Control Valves: Brass or ferrous metal body; stainless-steel piston and spring assembly; combination assemblies include bronze or brass-alloy ball valve.

B. Air Control Devices

1. Air Vents: Manual and automatic.
2. Expansion Tanks: ASME labeled with compression/diaphragm; bladder type is prohibited.
3. Air Separators: Tangential type and In-line.

C. Hydronic Piping Specialties

1. Strainers: Y-pattern, basket, and T-pattern.
2. Flexible Connectors: Stainless-steel bellows with woven-wire jacket.

D. Valve Applications

1. Shut-off duty valves for branch connection to supply mains, and at supply connection to each piece of equipment.
2. Calibrated-orifice, balancing valves for branch connection to return main.
3. Calibrated-orifice, balancing valves for return pipe of each heating or cooling terminal.
4. Check valves for each pump discharge and elsewhere as required to control flow direction.
5. Safety valves for hot-water generators.
6. Pressure-reducing valves for makeup-water connection to regulate system fill pressure.

Part 3 – Execution

No specific LBUSD requirements.

23 21 23 HYDRONIC PUMPS

Part 1 – General

A. Submittals

1. Product Data: For each type of pump.
2. Operation and Maintenance Data.

B. Warranty

Note to Design Professional: Require a minimum manufacturer's warranty of three years.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

Note to Design Professional:

- Unless otherwise approved by District, pumps shall be 1750/1800 rpm maximum.
- Use the most efficient pump for application. Applications below 70 percent efficiency are discouraged unless no other selections are available.
- Use of in-line pumps is strongly discouraged. Space-saving styles such as vertical in-line and close-coupled shall be used only where space constraints are an issue.

A. Impellers must be trimmed unless the pump is VFD controlled.

B. Bearings shall be permanently lubricated, and seals shall be best of class for application.

C. Factory start-up, alignment, and commissioning preparation required.

Part 3 – Execution

A. Testing: Include oversight from District Maintenance Manager during testing inspections and commissioning approval.

23 23 00 REFRIGERANT PIPING

Part 1 – General

A. Related Sections

1. 23 07 39: HVAC Piping Insulation: Refrigerant piping insulation.

B. Quality Assurance: Quality Standards: ASHRAE 15 and ASME B31.5.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Valves and Specialties

1. Diaphragm packless valves.
2. Packed-angle valves.
3. Check valves.
4. Service valves. Provide on all connections.

5. Charging valves.
6. Solenoid Valves: Voltage as required.
7. Safety relief valves.
8. Thermostatic expansion valves with adjustable superheat.
9. Hot-gas bypass valves.
10. Straight-type strainers.
11. Angle-type strainers.
12. Moisture/liquid indicators shall be provided for all systems.
13. Replaceable-core filter dryers with activated alumina or charcoal media shall be provided for all systems.
14. Mufflers as required.
15. Receivers as required.
16. Liquid accumulators as required.
17. Full port isolation ball valves with Schrader ports.

Part 3 – Execution

A. Piping Applications

1. Piping Applications: Follow current refrigerant recommended per the EPA, Maximum NPS 4.
2. Piping Applications for Refrigerant R-134a: Maximum NPS 4.
    a. Suction, Hot-Gas, and Liquid Lines: Copper with brazed joints.
    b. Safety-Relief-Valve Discharge Piping: Copper with brazed joints.
3. Piping Applications for Refrigerant R-407C: Maximum NPS 4.
    a. Suction, Hot-Gas, and Liquid Lines: Copper with brazed joints.
    b. Safety-Relief-Valve Discharge Piping: Copper with brazed joints.
4. Suction Lines for Conventional Air-Conditioning Applications: Copper.
5. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications:
    a. NPS 2 and Smaller: Copper with brazed joints.
    b. NPS 2-1/2 and Larger: Schedule 40, black steel with welded joints.
6. Safety-Relief-Valve Discharge Piping
    a. NPS 2 and Smaller: Copper with brazed joints.
    b. NPS 2-1/2 and Larger: Schedule 40, black steel with welded joints.

c. Schedule 40, black steel with welded joints.

Part 3 – Execution

Submit completed District Form "HVAC Information Log" including but not limited to make, model and serial number of each piece of equipment plus refrigerant type, capacity, and charge. Filter type, size and quantity also to be included on HVAC Information Log.

23 25 00 HVAC WATER TREATMENT

Part 1 – General

A. Summary

1. Bypass chemical-feed equipment and controls.
2. Biocide chemical-feed equipment and controls.
3. Chemical treatment test equipment.
4. HVAC water-treatment chemicals.
5. Makeup water softeners.
6. Water filtration units for HVAC makeup water.

B. Quality Assurance

1. Verify site water quality.
2. Single source of responsibility for water quality and treatment through construction to start-up is required, including pipe flushing, passivation, cleaning, testing, start-up and initial operation through warranty period.

C. Maintenance

1. Chemical and Service Program: For one year following date of Substantial Completion.

D. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Product

A. Acceptable Manufacturers

1. GE Betz http://www.gewater.com/
2. ONDEO Nalco Co http://www.nalco.com/
3. Or Approved Equal

Part 3 – Execution

A. Water Analysis

1. Contractor shall perform an analysis of supply water to determine the quality of water available at the Project site.

23 33 00 AIR DUCT ACCESSORIES

Part 1 – General

A. Section Includes

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Fire dampers.
6. Ceiling radiation dampers.
7. Smoke dampers.
8. Combination fire and smoke dampers.
9. Corridor dampers.
10. Flange connectors.
11. Duct silencers.
12. Turning vanes.
13. Remote damper operators.
14. Duct-mounted access doors.
15. Flexible connectors.
16. Flexible ducts.
17. Duct security bars.
18. Duct accessory hardware.

B. Related Sections

1. 23 37 23: HVAC Gravity Ventilators

C. Submittals

1. Product Data: For each type of product indicated.
    a. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

2. Shop Drawings.

D. Quality Assurance

1. Installation Standards

a. NFPA 90A.

b. NFPA 90B.

c. SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

d. California Mechanical Code.

E. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

a) Review and verify damper openings based on Sequence of Operations

b) Verify duct noise to ensure compliance per the latest edition of ASHRAE Applications, Chapter 48, Noise and Vibration Control.

Part 2 – Products

A. Provide airfoil blade dampers for applications over 1500 fpm.

B. Backdraft and Pressure Relief Dampers: Multiple blade, parallel action, gravity balanced with return springs.

C. Barometric Relief Dampers: Horizontal or vertical mounting; multiple blade, parallel action, gravity balanced with return springs.

D. Manual Volume Dampers: Multiple and single blade, parallel- and opposed-blade design, with linkage outside airstream.

1. Standard, steel, manual volume dampers.

2. Standard, aluminum, manual volume dampers.

3. Low-leak, steel, manual volume dampers.

4. Low-leak, aluminum, manual volume dampers.

E. Control Dampers: Parallel or Opposed-blade design; galvanized-steel, stainless-steel, or aluminum frame and blades.

1. In areas where access is limited, please install remote control dampers.

F. Fire Dampers: Static and dynamic, replaceable electric heat-responsive device.

G. Ceiling Radiation Dampers: Replaceable heat-responsive device.

H. Smoke Dampers

1. Multiple-blade type Curtain type with blades outside airstream except when located behind grille, where blades may be inside airstream.

2. Leakage: Class II.

I. Combination Fire and Smoke Dampers: Static and dynamic, replaceable electric heat-responsive device.

J. Corridor Dampers: Replaceable heat-responsive device and damper motors with modulating or two-position action.

K. Flange connectors.

L. Duct Silencers: Factory fabricated and tested, round or rectangular.

M. Turning Vanes: Double-blade, galvanized sheet steel.

N. Remote damper operators.

O. Duct-Mounted Access Doors: Double wall, rectangular, galvanized sheet steel with insulation.

P. Pressure Relief Access Doors: Double wall with insulation fill.

Q. Flexible Connectors: Indoor and outdoor, high temperature; and with thrust limits for flexible connections at high-pressure fan discharge.

R. Flexible Ducts: Insulated.

S. Duct security bars.

T. Duct accessory hardware.

Part 3 – Execution

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

23 34 00 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

Part 1 – General

A. Warranty

Note to Design Professional: Require manufacturer's warranties for a minimum duration of 1 year.

B. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

a. The commissioning agent must verify motor speed and frequency.

Part 2 – Products

A. Materials

1. Polyphase Motors: Design B, medium induction motors.
    a. Efficiency: Energy efficient.
    b. Service Factor: 1.15.
    c. Multispeed Motors: Variable torque.
    d. Rotor: Random-wound, squirrel cage.
    e. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
    f. Temperature Rise: Match insulation rating.
    g. Insulation: Class F.
    h. Code Letter Designation:
        i. Motors 15 HP and Larger: NEMA starting Code F or Code G.
        ii. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
    i. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.
2. Polyphase Motors with Additional Requirements
    a. Motors used with reduced-voltage and multispeed controllers.
    b. Energy- and premium-efficient and Inverter-duty motors used with variable frequency controllers.
    c. Severe-duty motors.
3. Single-Phase Motors
    a. Motors Larger than 1/20 HP: Permanent-split capacitor; split phase; capacitor start, inductor run; or capacitor start, capacitor run to suit starting torque and requirements of specific motor application.
    b. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
    c. Bearings: Pre-lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
    d. Motors 1/20 HP and Smaller: Shaded-pole type.
    e. Internal thermal protection.

Part 3 – Execution

No specific LBUSD requirements.

23 34 23 HVAC POWER VENTILATORS

Part 1 – General

A. Section Includes

1. Utility set fans.
2. Centrifugal roof ventilators.
3. Centrifugal wall ventilators.
4. Ceiling-mounted ventilators.
5. In-line centrifugal fans.

B. Quality Assurance

1. AMCA-Certified Ratings Seal.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Utility Set Fans

1. Direct-drive or Belt-driven centrifugal type, based on application, with galvanized-steel housing.
    a. Single-width, single-inlet, fan wheel.
    b. Flanged inlet and outlet.
    c. Companion flanges.
    d. Backdraft dampers.
    e. Access doors.
    f. Scroll dampers.
    g. Inlet screens.
    h. Drain connections.
    i. Weather hoods.
    j. Discharge dampers.
    k. Variable inlet vanes.
    l. Speed controller.

B. Centrifugal Roof Ventilators

1. Direct-drive or belt-driven centrifugal type, with spun-aluminum housing.

a. Variable-speed controller.
b. Disconnect switch inside fan housing.
c. Bird screens.
d. Backdraft dampers.
e. Motorized dampers.
f. Galvanized-steel roof curbs with built-in cant and mounting flange or built-in raised cant and mounting flange to suit roof construction. Consideration shall be given to lining the inside of the curbs with layers of gypsum board. One piece curbs are preferred. Curb top shall be a minimum of 8-inches (finish height) above the roof surface.

C. Centrifugal Wall Ventilators
1. Direct-drive or belt-driven centrifugal type, with spun-aluminum housing.
a. Variable-speed controller.
b. Disconnect switch.
c. Bird screens.
d. Wall grille.
e. Backdraft dampers.
f. Motorized dampers.

D. Ceiling-Mounted Ventilators
1. Housing: Steel with acoustical insulation.
2. Grille: Stainless steel, Aluminum, or Painted aluminum, louvered.
3. Accessories
a. Variable-speed controller.
b. Manual starter switch.
c. Time-delay switch.
d. Motion sensor.
e. Ceiling radiation damper.
f. Washable filter.
g. Vibration isolators.
h. Roof jack or wall cap and transition fittings.

E. In-Line Centrifugal Fans
1. In-line, direct-drive or belt-driven centrifugal type, with split, spun-aluminum housing, wheel, and outlet guide vanes.

a. Variable-speed controller.
b. Volume-control damper.
c. Companion flanges.
d. Fan guards.
e. Motor and drive cover (belt guard).

Part 3 – Execution

No specific LBUSD requirements.

23 36 00 AIR TERMINAL UNITS

Part 1 – General

A. Quality Assurance
   1. Installation Standard: ASHRAE 62.1 and NFPA 70.

B. Warranty

Note to Design Professional: Require manufacturer's warranty.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Products
   1. Bypass, Single-Duct Air Terminal Units:
      a. Bypass, single-duct air terminal units may be used with small HVAC systems having some diversity, but no VAV capability at unit.
      b. Configuration: Diverting-damper assembly inside unit casing.
      c. Casing: Steel Aluminum, double wall with removable access panels.
         i. Casing Lining: 1-inch- thick, fibrous-glass duct liner.
      d. Diverter Assembly: Galvanized-steel gate or Aluminum blade.
      e. Multioutlet Attenuator Section: With duct mounting collars, each with locking balancing damper.
      f. Hydronic Coils: Copper tube and aluminum fins.
      g. Electric-Resistance Heating Coils: Slip-in-type, open-coil design with factory-installed controls.

h. Controls: Electronic.

2. Shutoff, Single-Duct Air Terminal Units:
    a. Configuration: Volume-damper assembly inside unit casing.
    b. Casing: Steel or Aluminum, single wall with removable access panels.
        i. Casing Lining: 1-inch- thick, fibrous-glass duct liner.
    c. Regulator Assembly: System-air-powered bellows.
    d. Volume Damper: Galvanized steel with maximum airflow leakage of 3 percent at 6-inch wg inlet static pressure.
    e. Attenuator Section: Steel or Aluminum, internally insulated.
        i. Lining: 1-inch- thick, fibrous-glass duct liner.
    f. Multioutlet Attenuator Section: With collars, each with locking balancing damper.
    g. Hydronic Coils: Copper tube and aluminum fins.
    h. Factory-mounted and -wired, DDC microprocessor-based controls.
3. Diffuser-Type Air Terminal Units:
    a. Configuration: Volume-damper, diffuser, controller assembly and wall-mounted thermostat.
    b. Volume Damper: Galvanized steel.
    c. Diffuser: Galvanized steel.
    d. Electronic controls.
4. Hangers and supports.
5. Seismic restraints.

B. Source Quality Control
    1. Air terminal units rated according to AHRI 885.

Part 3 – Execution

A. Field Quality Control
    1. Contractor-engaged testing agency.

23 37 13 DIFFUSERS, REGISTERS, AND GRILLES

Part 1 – General

A. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

Contractor must install filters at the return air grills.

23 37 23 HVAC GRAVITY VENTILATORS

Part 1 – General

A. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

No specific LBUSD requirements.

23 41 00 PARTICULATE AIR FILTRATION

Part 1 – General

A. Submittals

1. Maintenance Material Submittals

Note to Design Professional: Require Contractor to furnish sets of filters required by code or program for construction period. Clean filters shall be installed at time of District acceptance of Project. Furnish extra set of filters for each piece of equipment for retention by District. Provide, on District provided form, all filter information including type, size/dimensions, quantity, and location of filter.

B. Quality Assurance

1. Quality Standards: ASHRAE 62.1 ASHRAE 52.1 and ASHRAE 52.2 and NFPA 90A and NFPA 90B.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Ultra-High Performance Filters

1. Acceptable Manufacturers

a. Airguard High Efficiency 2" Mini-Pleat filter ——with certified ASHRAE 52.2 MERV 16 efficiency, with no more than 0.40 inches w.c. initial resistance at 500 fpm.

b. Or Approved Equal

B. Flat Panel Filters

1. Media: Interlaced glass fibers and antimicrobial agent.
2. Frame: Cardboard frame with perforated metal retainer.
3. MERV Rating: As noted in Design Criteria.

C. Pleated Panel Filters

1. Media: Interlaced glass or synthetic fibers or Cotton and synthetic fibers.
2. Filter-Media Frame: Cardboard frame with perforated metal retainer.
3. MERV Rating: As noted in Design Criteria.

D. Non-supported Bag Filters

1. Media: Fibrous material formed into tapered pleats and antimicrobial agent.
2. Filter-Media Frame: Galvanized steel.
3. Media Frames: Galvanized steel.
4. MERV Rating: As noted in Design Criteria.

E. Supported Bag Filters

1. Media: Fibrous material.
2. Filter-Media Frame: Galvanized steel.
3. Mounting Frames: Welded galvanized steel.
4. MERV Rating: As noted in Design Criteria.

F. Front- and Rear-Access Filter Frames: Galvanized-steel or Aluminum framing with prefilters in a separate track.

G. Side-Service Housings: Galvanized steel or Aluminum with disposable prefilters and access doors.

H. Filter Gages: Manometer type or switches tied to building EMS.

Part 3 – Execution

A. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing with new, clean filters.

23 52 00 HEATING BOILERS

Part 1 – General

A. Summary

1. Packaged, factory-fabricated and -assembled, gas-fired, pulse-combustion, fire-tube, water-tube, and water-jacketed condensing boilers, trim, and accessories for generating hot water, and packaged, factory-fabricated and assembled, gas-fired, water-tube and fire-tube non-condensing boilers, trim, and accessories for generating hot water.

B. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. ASME Stamp Certification and Report.
4. Operation and Maintenance Data:

C. Quality Assurance

1. Quality Standard: ASME Boiler and Pressure Vessel Code.
2. Minimum Efficiency: ASHRAE/IESNA 90.1, and per California Energy Code.
3. I=B=R compliance.
4. UL Compliance: UL 795.

D. Warranty

Note to Design Professional: Require manufacturer's Materials and Workmanship Warranty:

- Heat Exchangers for Thermal Shock
- Fire-Tube Boilers
- Water-Tube Boilers
- Water-Jacketed Boilers

E. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Acceptable Manufacturers

1. Cleaver Brooks, Inc. http://www.cleaver-brooks.com/
2. Parker Boiler Co. http://www.parkerboiler.com/

3. Bryan Boilers http://www.bryanboilers.com/about_bryan_boilers.html
4. Or Approved Equal

B. Trim (California Code Minimum)

1. Aquastat controllers.
2. Safety Relief Valve: ASME rated.
3. Pressure and temperature gage.
4. Boiler Air Vent: Automatic.
5. Drain valve.
6. Circulation pump as required.
7. Valves.

C. Controls

1. Boiler Operating Controls (California Code): With building management system interface.

D. Electrical Power: Single-point field power connection.

E. Source Quality Control

1. Boilers: Factory tested and inspected.

Part 3 – Execution

A. Testing: Include oversight from District HVAC Supervisor during testing inspections and commissioning approval.

23 54 00 FURNACES

Part 1 – General

A. Related Sections

1. 23 09 00: Instrumentation and Controls for HVAC
2. 23 41 00: Particulate Air Filtration

B. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Operation and Maintenance Data.

C. Warranty

Note to Design Professional: Require manufacturer's Materials and Workmanship for the following:

- Furnace Heat Exchanger

- Integrated Ignition and Blower Control Circuit Board
- Draft-Inducer Motor
- Refrigeration Compressors
- Evaporator and Condenser Coils

D. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Gas-Fired Furnaces, Condensing: Factory assembled, piped, wired, and tested; ANSI Z21.47/CSA 2.3.

1. Cabinet: Galvanized steel, with interior insulation.
2. Fan: Centrifugal, direct drive.
3. Fan Motors: Multitapped, multispeed or electronically controlled.
4. Type of Gas: Natural.
5. AFUE: 90 to 95 percent.
6. Gas Valve: Two stage or Modulating.
7. Automatic solid-state controls; diagnostic light with viewport.
8. Accessories: Combination combustion-air intake and vent.
9. Plastic Vent Material: CPVC.

B. Thermostats and Humidistats

1. Coordinate with Section 23 09 00.

C. Air Filters

1. Coordinate with Section 23 41 00.

D. Ventilation-Air Heat Exchangers:

1. Cabinet: Steel.
2. Fixed-plate heat exchanger.
3. Supply and exhaust fans.
4. Disposable filter.

E. Refrigeration Components

1. Evaporator Coil: Copper tubes expanded into aluminum fins; size matched with furnace.
2. Refrigerant line kits.
3. Reciprocating or scroll air-cooled, compressor-condenser unit.

4. Refrigerant: Follow the current refrigerant requirements per the EPA.

Part 3 – Execution

A. Install gas-fired furnaces and associated fuel and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written installation instructions.

23 55 13 FUEL-FIRED DUCT HEATERS

Part 1 – General

A. Related Sections

1. 23 09 00: Instrumentation and Controls for HVAC

B. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Coordination Drawings.
4. Operation and Maintenance Data.

C. Warranty

Note to Design Professional: Require manufacturer's Materials and Workmanship for Heat Exchanger.

D. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Gas-Fired Duct Heaters: Factory assembled, piped, and wired; ANSI Z83.8/CSA 2.6.

1. Type of Gas: Natural.
2. Venting: Gravity vented.
3. Indoor External Housing: Steel cabinet.
4. Outdoor External Housing: Weatherproof steel cabinet.
5. Internal Casing: Aluminized steel.
6. Heat Exchanger: Stainless steel.
7. Burners: Stainless steel.
8. Controls
    a. Gas Control Valve: Two stage or Modulating.
    b. Ignition: Electronically controlled electric spark with flame sensor.

c. Thermostat: Coordinate with Section 23 09 00.

Part 3 – Execution

A. Install and connect gas-fired duct heaters and associated fuel and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written installation instructions.

23 55 23.13 LOW-INTENSITY, GAS-FIRED, RADIANT HEATERS

Part 1 – General

A. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Operation and Maintenance Data.

B. Warranty

Note to Design Professional: Require manufacturer's warranty for Burner Assembly and Combustion and Emitter Tubes.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

No specific LBUSD requirements.

23 55 33 FUEL-FIRED UNIT HEATERS

Part 1 – General

A. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Operation and Maintenance Data.

B. Warranty

Note to Design Professional: Require Materials and Workmanship warranty for Heat Exchanger.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

No specific LBUSD requirements.

23 62 00 PACKAGED COMPRESSOR AND CONDENSER UNITS

Part 1 – General

A. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Coordination Drawings.
4. Operation and Maintenance Data.

B. Quality Assurance

1. Quality Standard: ASHRAE 15, ASHRAE/IESNA 90.1, and California Building/Energy Codes.

C. Warranty

Note to Design Professional: Require manufacturer's warranty on compressors only, condenser coil only, and components other than the compressor.

D. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Manufacturers

1. Lennox http://www.lennoxcommercial.com
2. Carrier Corporation http://www.carrier.com/carrier/en/us/
3. Trane http://www.trane.com/Commercial/
4. Daikin http://www.daikinapplied.com/
5. Mitsubishi https://mehvac.com/
6. Or Approved Equal

B. Products

1. Air-Cooled Units, 1 to 5 Tons

a. Compressor: Scroll, hermetically sealed and isolated, single or two speed.

b. Refrigerant: Follow the current refrigerant requirements per the EPA.

c. Condenser Coil: Copper-tube, aluminum-fin coil with liquid subcooler.

d. Condenser Fan: Direct-drive, aluminum propeller fan; with permanently lubricated, totally enclosed fan motor.

e. Accessories: Coastal filter, crankcase heater, cycle protector, electronic programmable thermostat , evaporator freeze thermostat, filter-dryer, high-pressure switch, liquid-line solenoid, low-ambient controller, low-pressure switch, PE mounting base, precharged and insulated suction and liquid tubing, sound hood, thermostatic expansion valve, time-delay relay, reversing valve.

f. Unit Casing: Galvanized steel.

2. Air-Cooled Units, 6 to 120 Tons

a. Compressor: Hermetic scroll, with on-off compressor cycling capacity control.

b. Compressor: Hermetic or semi hermetic rotary.

c. Refrigerant: Follow the current refrigerant requirements per the EPA.

d. Condenser Coil: Copper-tube, aluminum-fin coil with subcooler.

e. Condenser Fan: Propeller type.

f. Controls: Factory mounted and wired.

g. Accessories: Electronic programmable thermostat, low-ambient controller, gage panel, hot-gas bypass kit, part-winding-start, timing relay, circuit breakers, and contactors, reversing valve.

h. Unit Casing: Galvanized or zinc-coated steel.

3. Water-Cooled Units

a. Compressor: Hermetic or serviceable hermetic type, with oil pump, operating oil charge, and suction and discharge shutoff valves.

i. Capacity Control: Cylinder unloading.

b. Refrigerant: Follow the current refrigerant requirements per the EPA.

c. Condenser: Multipass, shell-and-tube type.

d. Accessories: Discharge-line muffler, gage panel, electric solenoid cylinder unloaders, pump-down relay package, and crankcase cover plates with equalizer connections.

e. Controls: Factory mounted and wired.

f. Unit Casing: Galvanized steel.

C. Source Quality Control

1. Compressor and Condenser Units: Rate according to AHRI 210/240 and AHRI 340/360.

Part 3 – Execution

No specific LBUSD requirements.

23 63 13 AIR-COOLED REFRIGERANT CONDENSERS

Part 1 – General

A. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Coordination Drawings.
4. Operation and Maintenance Data.

B. Warranty

Note to Design Professional: Require manufacturer's warranty.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Components

1. Factory assembled and tested units.
    a. Refrigerant: Follow the current refrigerant requirements per the EPA.
    b. Condenser Coil: Copper tube, aluminum -fin coil with liquid subcooler.
    c. Condenser Fans and Drives: Direct drive, propeller.
    d. Casing: Galvanized or zinc-coated steel.

B. Source Quality Control

1. Rate according to AHRI 460.

Part 3 – Execution

No specific LBUSD requirements.

23 63 13 EVAPORATIVE REFRIGERANT CONDENSERS

Part 1 – General

A. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.

3. Coordination Drawings.
4. Operation and Maintenance Data.

B. Quality Assurance

1. Quality Standard for Heat-Exchanger Coils: ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

C. Warranty

Note to Design Professional: Require manufacturer's warranty Materials and Workmanship warranty on:

- Fan, motor, drive shaft, bearings, and motor supports.
- Tube bundle.
- External-circuit circulating pump.

D. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Forced-Draft Evaporative Refrigerant Condensers

1. Casing Material: Stainless steel.
2. Frame Material: FRP with UV inhibitors Galvanized steel.
3. Collection Basin: Field fabricated.
    a. Factory-Fabricated Collection Basin Material: Stainless steel.
    b. Basin sweeper distribution piping and nozzles.
4. Collection-Basin Water-Level Controls: Electric/electronic.
5. Water Distribution Piping: Galvanized steel.
6. Recirculating Piping: PVC, with connections for separately provided, remote spray pump.
7. Spray pump.
8. Heat-Exchanger Coil Material: Copper tube with stainless-steel sheet.
9. Drift Eliminator Material: PVC.
10. Inlet Screen Material: Polymer-coated, galvanized- or Stainless-steel wire mesh.
11. Fans: Belt-driven, centrifugal.
12. Vibration switch.
13. Control package.

B. Induced-Draft Evaporative Refrigerant Condensers

1. Casing Material: Stainless steel.
2. Frame Material: Stainless steel.
3. Collection Basin: Factory fabricated.
    a. Factory-Fabricated Collection Basin Material: Stainless steel.
4. Collection-Basin Water-Level Controls: Electric/electronic.
5. Pressurized Water Distribution Piping: Galvanized steel; and manufacturer's standard spray nozzles.
6. Recirculating Piping: PVC.
7. Spray pump.
8. Heat-Exchanger Coil Material: Copper tube with stainless-steel sheet.
9. Drift Eliminator Material: PVC.
10. Air-Intake Screen Material: Matching casing.
11. Fans: Belt-driven, axial; manufacturer's standard blades and hub.
12. Discharge Stack: Manufacturer's standard design.
13. Vibration switch.
14. Control package.

Part 3 – Execution

No specific LBUSD requirements.

23 64 00 WATER CHILLERS

Part 1 – General

A. Submittals
    1. Product Data: For each type of product indicated.
    2. Shop Drawings.
    3. Coordination Drawings.
    4. Operation and Maintenance Data.

B. Quality Assurance, Centrifugal Water Chillers:
    1. Certification: AHRI 550.
    2. Compliance: ASHRAE 15 and 147, ASHRAE/IESNA 90.1, ASME, NFPA 70, UL.
    3. Performance Rating: AHRI 550/590.
    4. Sound Rating: AHRI 575.

C. Quality Assurance, Scroll Water Chillers:

1. Certification: AHRI 590.
2. Compliance: ASHRAE 15, ASHRAE/IESNA 90.1, ASME Boiler and Pressure Vessel Code, and NFPA 70.
3. Performance Rating: AHRI 550/590.

D. Quality Assurance, Rotary-Screw Water Chillers:

1. Certification: AHRI 550 for water-cooled chillers and AHRI 590 for air-cooled chillers.
2. Compliance: ASHRAE 15 and 147, ASHRAE/IESNA 90.1, ASME, NFPA 70, UL.
3. Performance Rating: AHRI 550/590.
4. Sound Rating: AHRI 370 for chillers located outdoors and AHRI 575 for chillers located indoors.

E. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Acceptable Manufacturers

1. Carrier Corporation http://www.carrier.com/carrier/en/us/
2. Daikin https://www.daikinapplied.com/
3. Trane http://www.trane.com/Commercial/
4. Or Approved Equal

B. Centrifugal Water Chillers

1. Components

a. Compressor-Drive Assembly: Variable displacement with open or hermetic, direct or gear drive.

i. Capacity Control: Variable-inlet, guide-vane assembly combined with hot-gas bypass, if necessary, to achieve performance indicated.

ii. Oil Lubrication System: Consisting of pump, filtration, heater, cooler, factory-wired power connection, and controls.

b. Refrigeration

i. Refrigerant: R-32.

ii.

c. Evaporator: Shell-and-tube design with carbon steel shell and individually replaceable tubes with enhanced or smooth internal finish and standard or marine water box. Provide marine water box for water box with piping connections unless space constrained.

d. Condenser: Shell-and-tube design with carbon steel shell and individually replaceable tubes with enhanced or smooth internal finish and standard or marine water box. Provide marine water box for water box with piping connections unless space constrained.

e. Heat-Reclaim Condenser: Shell-and-tube design with carbon steel shell and individually replaceable tubes with enhanced or smooth internal finish and standard or marine water box. Provide marine water box for water box with piping connections unless space constrained.

f. Insulation for Cold Surfaces: Closed cell, flexible elastomeric.

g. Electrical: Single-point, field-power connection to fused disconnect switch.

h. Motor Controllers: Variable frequency controller. Provide the following accessories

    i. Push-button stations.

    ii. Time-delay relays.

    iii. Elapsed-time meters.

    iv. Panel-type meters.

    v. Multifunction digital-metering monitor.

    vi. Phase-failure and undervoltage relays.

i. Controls: Microprocessor based.

    i. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, digital display.

    ii. BAS Interface: Hardwired points or Communication interface.

j. Accessories

    i. Flow switch: Paddle or Pressure differential type.

    ii. Vibration Isolation: Neoprene pads or Spring isolator per manufacturers' recommendations.

    iii. Sound Barrier: Removable and reusable sound-barrier covers over the compressor housing, hermetic motor, compressor suction and discharge piping, and condenser shell.

    iv. Service Tools

        a. Provide service tools that connect to the mechanical equipment to service and perform system diagnostics

        b. Provide manufacturer approved service tools

        c. Provide two (2) set of tools per project site

            i. Contractor to provide multiple service tools if different manufacture equipment is installed

k. Packaged Refrigerant Recovery Unit: Packaged portable unit consisting of compressor, air-cooled condenser, recovery system, tank pressure gages, filter-dryer, and valving.

l. Heat-Exchanger, Brush-Cleaning System: Furnish on each chiller condenser consisting of brushes in individual tubes, four-way automatic flow-diverting valve, and control panel.

2. Source Quality Control

a. Evaporator and Condensers: Factory tested and inspected according to ASME Boiler and Pressure Vessel Code.

C. Scroll Water Chillers

1. Components

a. Compressors: Positive-displacement, direct drive, hermetically sealed.

i. Capacity Control: On-off compressor cycling of compressors, plus hot-gas bypass.

ii. Sound-Reduction Package: Acoustic enclosure around compressors.

b. Compressor Motors: Hermetically sealed, refrigerant cooled, high-torque, two-pole induction type with inherent thermal-overload protection on each phase.

c. Motor Controllers: Across-the-line controller.

d. Refrigerant and Oil: Manufacturer Recommended and meets current EPA requirements

e. Refrigerant circuit isolation valves.

f. Evaporator: Shell-and-tube direct-expansion design.

g. Condenser for Water-Cooled Water Chillers: Shell and tube.

h. Air-Cooled Condenser: Copper tubes with aluminum fins with corrosion-resistant coating, or copper tubes with copper fins, rated at 450 psig.

i. Electrical Power: Factory wired for single-point field power connection.

i. Enclosure: NEMA 250, Type 1 or Type 3R, as required, with lockable hinged access door.

ii. Field Power Interface: Heavy-duty, nonfused disconnect switch.

j. Controls: Microprocessor based.

i. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, backlit, liquid-crystal display or light-emitting diodes.

ii. Building Management System Interface: Hardwired points or Communication interface.

k. Insulation for Cold Surfaces: Closed cell, flexible elastomeric.

l. Accessories

a. Factory-installed, hot-gas bypass capacity control.

b. Low ambient or high ambient control as required.

c. Chilled-water flow switch.

d. Suction and discharge pressure gages.

2. Source Quality Control

a. Water Chillers: Factory functionally tested.

b. Performance tested according to AHRI 550/590.

c. Evaporator and Water-Cooled Condenser: Factory tested and inspected according to ASME Boiler and Pressure Vessel Code.

d. Sound Power Level: AHRI 370 or 575 rating procedures, as applies.

D. Rotary-Screw Water Chillers

1. Packaged, water-cooled, single-compressor chillers.

a. Compressor: Hermetic.

b. Capacity Control: Modulating slide-valve assembly or port unloaders combined with a variable frequency controller and hot-gas bypass, if necessary, to achieve performance indicated.

i. Operating Range: From 100 to 5 percent of design capacity.

ii. Condenser-Fluid Unloading Requirements over Operating Range: To suit project.

c. Oil Lubrication System

i. Pump.

ii. Oil filter.

iii. Heater.

iv. Refrigerant- or water-cooled oil cooler.

v. Factory-wired power connection.

vi. Controls.

d. Refrigerant Circuit

i. Refrigerant Type: R-32.

ii. ASME-rated, spring-loaded, pressure relief valve.

iii. Refrigerant circuit isolation valves.

e. Evaporator

i. Water Box: Standard or Marine. Provide marine water box for water box with piping connections unless space constrained.

ii. Tubes: Copper or copper-nickel alloy with enhanced or smooth internal finish.

f. Condenser

i. Water Box: Standard or Marine.

ii. Tubes: Copper or copper-nickel alloy with enhanced or smooth internal finish.

g. Heat-Reclaim Condenser

i. Water Box: Standard Marine. Provide marine water box for water box with piping connections unless space constrained.

ii. Tubes: Copper or copper-nickel alloy with enhanced or smooth internal finish.

h. Electrical Power: Single-point, field-power connection to fused disconnect switch.

i. Motor Controllers: Variable frequency.

i. Enclosure: Factory installed, unit mounted, NEMA 250 or NEMA ICS 6, Type 1, Type 4, Type 4X, or Type 12 as required, with lock and key or padlock and key.

ii. Control Circuit: Integral control power transformer.

iii. Accessories

a. Externally operated, fused disconnect switch.

b. Push-button stations, pilot lights, and selector switches.

c. Stop and lockout push-button station.

d. Time-delay relays.

e. Elapsed-time meters.

f. Number-of-starts counter.

g. Multifunction digital-metering monitor.

h. Phase-failure, phase-reversal, and undervoltage relays.

i. Power-protection shut down.

j. Controls: Microprocessor based.

i. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, digital display.

ii. BAS Interface: Hardwired points.

k. Insulation for Cold Surfaces: Closed-cell, flexible elastomeric.

l. Accessories

i. Flow Switch: Paddle or Pressure differential type.

ii. Vibration Isolation: Neoprene pads or spring, per manufacturers' recommendations.

iii. Sound Barrier: Removable and reusable sound-barrier covers over the compressor housing, hermetic motor, compressor suction and discharge piping, and condenser shell.

Part 3 – Execution

A. Testing: Include oversight from District HVAC Supervisor during testing inspections and commissioning approval.

23 65 00 COOLING TOWERS

Part 1 – General

A. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Coordination Drawings.
4. Operation and Maintenance Data.
5. Water treatment system, including analysis of water and sump cleaning/filtration system.

B. Quality Assurance

1. ASHRAE/IESNA 90.1 for energy efficiency.
2. ASME Compliance: ASME Boiler and Pressure Vessel Code: Section VIII, Division 1 for heat-exchanger coils.
3. CTI Certification: CTI STD 201 for thermal performance.

C. Extra Stock

Note to Design Professional: Require extra set of belts with each unit.

D. Warranty

Note to Design Professional: Require manufacturer's Material and Workmanship warranty.

E. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Acceptable Manufacturers/Models

1. Baltimore Aircoil Company http://www.baltimoreaircoil.com/
    a. Models VFL and VFI.
2. Delta Cooling Towers, Inc. http://deltacooling.com/
    a. Pioneer Model.
3. Evapco, Inc. http://www.evapco.com/
    a. Models LSWA and LRW.
4. Or Approved Equal

B. Closed-Circuit, Forced-Draft, Counterflow Cooling Towers

1. Casing: FRP with UV inhibitors or Stainless steel.
2. Collection Basin: FRP with UV inhibitors or Stainless steel.
3. Collection Basin Water-Level Control: Electric/electronic water-level controller with solenoid valve.
4. Water Distribution Piping: PVC pipe with nonclogging nozzles.
5. Recirculating Piping: PVC pipe.
6. Spray Pump and Motor: Close-coupled, end-suction, single-stage, bronze-fitted centrifugal pump with totally enclosed motor.

    Note to Design Professional: Locate pump in close proximity to cooling tower.
7. Heat-Exchanger Coil: Copper tube with stainless-steel sheet or Stainless-steel tube and sheet with serpentine tubes with removable cover plate on inlet and outlet headers.
8. Drift Eliminator: Manufacturer's standard material.
9. Air-Intake Screens: Removable stainless-steel wire mesh.
10. Fan: Centrifugal, double-width, double-inlet, with grease-lubricated bearings.
11. Fan Drive: One-piece, multi-grooved, solid-back belt.
12. Fan Motor: Totally enclosed air over (TEAO); severe-duty rating.
13. Discharge Hood: Same material as casing; and having factory-installed access doors.
14. Capacity Control Dampers: Stainless-steel dampers, with integral controls.
15. Vibration Switch: For each fan drive with manual-reset button.
16. Controls: Factory installed and wired, and functionally tested at factory before shipment. Controls shall be as manufactured by Walchem, or Approved equal.
17. Personnel Access Components: Ladders and cages, platforms, and handrails, constructed of aluminum.

C. Source Quality Control

1. Cooling Towers: Tested and certified according to CTI STD 201.

Part 3 – Execution

A. Field Quality Control

1. Testing: By Contractor-engaged agency.
2. Testing Procedures: ASME PTC 23, "ASME Performance Test Codes - Code on Atmospheric Water-Cooling Equipment."
3. Testing: Include oversight from District HVAC Supervisor during testing inspections and commissioning approval.

23 74 13 PACKAGED, OUTDOOR, HVAC UNITS

Part 1 – General

A. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Coordination Drawings.
4. Operation and Maintenance Data.

B. Quality Assurance: Quality Standards AHRI 203/110, AHRI 303/110, ASHRAE 15, ASHRAE 90.1, NFPA 90A, and NFPA 90B.

C. Warranty

Note to Design Professional: Require manufacturer's warranty.

D. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project.

Part 2 – Products

A. Manufactured Units

1. Acceptable Manufacturers
   a. Lennox http://www.lennoxcommercial.com
   b. Carrier Corporation http://www.carrier.com/carrier/en/us/
   c. Daikin http://www.daikinapplied.com/products.php
   d. Trane http://www.trane.com/Commercial/
   e. Or Approved Equal
2. Casing
   a. Galvanized steel painted with baked enamel.
   b. Galvanized-steel liner.

c. Insulated with fiberglass.

d. Galvanized or Stainless-steel secondary drain pan.

3. Supply-Air Fan: Direct driven, double width, forward curved or backward inclined, centrifugal.
4. Supply-Air Fan: Belt driven, forward curved, centrifugal.
5. Condenser-Coil Fan: Direct-driven propeller.
6. Supply-Air Refrigerant Coil: Coated Aluminum -plate fins and seamless copper tube, or copper plate fins and seamless copper tube.
7. Refrigerant Circuit Components
    a. Number of Refrigerant Circuits: One or two.
    b. Compressor: Hermetic reciprocating, semi hermetic reciprocating, or hermetic scroll.
    c. Refrigerant Charge: Follow the current refrigerant requirements per the EPA.
    d. Low-ambient kit.
    e. Hot-gas reheat valve.
    f. Hot-gas bypass valve.
    g. Four-way reversing valve.
8. Filters: Disposable, pleated.
9. Gas Furnace
    a. Heat Exchanger and Secondary Drain Pan: Stainless steel.
    b. Fuel: Natural.
    c. Ignition: Electronic.
    d. Gravity or Power vent. When using gravity vent, provide unit with modulating power exhaust
    e. Single-stage, Two-stage or Modulating gas control valve. Two-stage and modulating are preferred.
10. Outdoor-Air Damper: 0 to 25 percent, with motorized damper and hood.
11. Outdoor- and Return-Air Mixing Dampers: 0 to 100 percent economizer with motorized dampers and hood.
12. Electrical Power Connection: Single with unit-mounted disconnect.
13. Basic Unit Controls: Wall-mounted thermostat or sensor.
14. DDC Controllers
    a. Safety controls.

b. Scheduled controls.
c. Unoccupied period controls.
d. Supply fan controls.
e. Refrigerant circuit controls.
f. Hot-gas reheat-coil controls.
g. Gas furnace controls.
h. Electric-heating-coil controls.
i. Fixed minimum outdoor-air controls.
j. Economizer dry-bulb -based controls.
k. Carbon dioxide sensors (interior and exterior).
l. VVT relays.
m. Interface with HVAC instrumentation and control system.

15. Accessories
    a. Gas burner compartment heater.
    b. Duplex electrical outlet.
    c. Low-ambient kit.
    d. Filter differential pressure switch.
    e. Coil guards.
    f. Concentric diffuser.
    g. Service Tools
        1. Provide Service tools that connect to mechanical equipment to service and perform system diagnostics
        2. Provide manufacturer approved service tools
        3. Provide two (2) sets of tools per project site
            a. Contactor to provide multiple service tools if different manufacture equipment is installed
    h.
16. Roof Curb
    a. Vibration isolators.
    b. Wind restraints.
    c. Seismic restraints.

Part 3 – Execution

No specific LBUSD requirements.

23 75 13 MODULAR, CUSTOM-PACKAGED, OUTDOOR, CENTRAL-STATION AIR-HANDLING UNITS

Part 1 – General

A. Summary

1. Constant-air-volume, single-zone air-handling units.
2. Variable-air-volume, single-zone air-handling units.

B. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Coordination Drawings.
4. Operation and Maintenance Data.
5. District HVAC Info Log

C. Quality Assurance

1. Quality Standards: AHRI 430, NFPA 70, and NFPA 90A.

D. Warranty

Note to Design Professional: Require manufacturer's warranty.

E. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project. Air handlers shall be four-pipe for centralized systems.

Part 2 – Products

A. Acceptable Manufacturers

1. Haakon Industries http://www.haakon.com/
2. United Metal Products http://www.unitedmetal.com/
3. Temtrol http://www.temtrol.com/
4. Or Approved Equal

B. Components

1. Unit Casing
    a. Outside Casing: Galvanized steel.
    b. Coatings.

c. Inside Casing: Galvanized steel Aluminum Stainless steel; solid or perforated.
d. Floor Plate: Galvanized steel.
e. Cabinet Insulation: thickness as required.
f. Static-Pressure Classifications for Unit Sections before Fans: As required.
g. Static-Pressure Classifications for Unit Sections after Fans: As required.
h. Inspection access panels and access doors.
i. Condensate Secondary Drain Pans: Singlewall, stainless-steel sheet, formed sections or integral part of floor plating.
j. Service Platforms: Galvanized steel.
k. Mounting Frame: Galvanized-steel channels with seismic restraints as required.

2. Supply Fan Section
   a. Drive: V-belt or Direct.
   b. Fan Wheels: Centrifugal or Axial.
   c. Variable-inlet vanes.
   d. Discharge dampers.
   e. Internal vibration control.
   f. Motors.
   g. Variable frequency controllers.
3. Return Fan Section
   a. Drive: V-belt or Direct.
   b. Fan Wheels: Centrifugal or Axial.
   c. Variable-inlet vanes.
   d. Discharge dampers.
   e. Internal vibration control.
   f. Motors.
   g. Variable frequency controllers.
4. Coils
   a. Fan Coil: Must be four-pipe for centralized systems.
   b. Heating Coil: Hot water.
   c. Cooling Coil: Chilled water or Refrigerant.
   d. Water Coils: Continuous circuit, Self-draining, Cleanable.
      i. Tubes: Copper.

ii. Fins: Copper.

iii. Frames: Galvanized steel.

e. Refrigerant Coils: The system shall follow the latest refrigerant requirements per the EPA.

i. Tubes: Copper.

ii. Fins: Copper.

iii. Frames: Galvanized steel.

f. Pre-filters

i. Disposable panel.

ii. Extended-surface, disposable panel.

iii. Extended-surface, non-supported media.

iv. Automatic roll.

v. Activated-carbon panel.

vi. Activated carbon.

vii. HEPA.

g. Filters

i. Disposable panel.

ii. Extended-surface, disposable panel.

iii. Extended-surface, non-supported media.

iv. Automatic roll.

v. Activated-carbon panel.

vi. Activated carbon.

h. Filter gages.

i. Dampers

i. Leakage Rate: Not to exceed 2 percent at 2000-fpm face velocity and 4-inch wg pressure differential; AMCA 500.

ii. Damper Operators: Electronic.

iii. Zone Dampers: Two, single blade, galvanized steel.

iv. Face-and-Bypass Dampers: Opposed blade, galvanized steel.

v. Low-Leakage, Outside-Air Dampers: Double skin, airfoil blade, galvanized steel.

vi. Mixing Boxes: Opposed or Parallel blade, galvanized steel.

vii. Combination filter and mixing box.

viii. Air-To-Air Energy Recovery: As required.

Part 3 – Execution

No specific LBUSD requirements.

23 81 29 VARIABLE REFRIGERANT FLOW (VRF) HVAC SYSTEM

Part 1 – General

A. Required Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.
3. Coordination Drawings.
4. Operation and Maintenance Data.

B. Quality Assurance: Comply with the following standards and ratings.

1. AHRI 203/110 and AHRI 303/110 Compliance.
2. AHRI 1230: System and equipment performance certified according to
3. ASHRAE 15: For safety code for mechanical refrigeration.
4. ASHRAE 62.1: For indoor air quality.
5. ASHRAE 135: For control network protocol with remote communication.
6. ASHRAE/IES 90.1: For system and component energy efficiency.
7. NFPA 90A: Standard for the Installation of Air-Conditioning and Ventilating Systems.
8. NFPA 90B: Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
9. NFPA 70: National Electric Code.
10. UL 1995: Comply with.
11. Comply with OSHA regulations
12. And any other applicable standards or requirements

C. Warranty

Note to Design Professional:

- A 10-year manufacturer's equipment warranty including compressors is required.
- A 5-year manufacturer's equipment warranty on parts is required.

- Compressors
- Fan
- Evaporators
- Valves
- Coils

- The contractor is responsible for submitting all close-out documents to adhere to the manufacturer warranty requirements. These documents must be submitted to the manufacturer at least 15 days before the due date.

D. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that apply to the specific project. VRF start-up is required to be conducted by factory certified installers and inspected and approved by the manufacturer.

Part 2 – Products

A. Manufacturers

All systems shall be compatible with the third-party thermostats unless otherwise approved by LBUSD.

1. Daikin http://www.daikinac.com
2. Trane/Mitsubishi https://www.mitsubishipro.com
3. Toshiba Carrier https://www.carrier.com/commercial/en/us/vrf/
4. LG https://www.lg.com
5. Or Approved Equal

Note to Design Professional: VRF system must utilize heat recovery

B. Components:

1. Outdoor Unit, Indoor Unit, Branch Circuit Control Unit:
    a. Obtain these system components from a single source and from a single manufacturer)
    b. System components shall be shipped from the factory fully assembled including internal refrigerant piping, compressor, contacts, relay(s), power and necessary communications wiring.
    c. Each piece of equipment shall be installed with isolation ball valves entering and exiting each piece of equipment.
2. Compressor(s)
    a. The unit shall be equipped with hermetically sealed, inverter driven, rotary compressor.

b. The inverter driven, digitally twin rotary compressor shall be capable of operating in a frequency range from 30 Hz to 100 Hz with control in 1 Hz increments.

c. The compressor(s) shall be equipped with a 60-Watt crankcase heater (or similar approved).

d. The compressor shall be provided with a full charge of oil from the factory. Only oil approved by the manufacturer is allowed.

e. The compressor bearing(s) shall be Teflon™ coated.

f. The compressor(s) shall be mounted on rubber isolation grommets.

g. The compressor(s) shall be wrapped with heat resistant, sound attenuating blanket.

h. Inverter compressor(s) safeties shall include a minimum of:

i. High Pressure switch

ii. Over-current /under current protection

iii. Phase failure

iv. Phase reversal

3. Service Tools

i. Provide service tools that connect to mechanical equipment to service and perform system diagnostics

ii. Provide manufacturer approved service tools

iii. Provide two (2) sets of tools per project site

1. Contractor to provide multiple service tool sets if different manufacture equipment is installed

4. Sensors

i. Each compressor unit cabinet shall be equipped with:

i. Suction temperature sensor

ii. Discharge temperature sensor

iii. High Pressure sensor

iv. Low Pressure sensor

v. Heat exchanger temperature sensor

ii. Each indoor unit cabinet shall be equipped with sensors that can integrated to the BAS system:

i. Discharge air temperature

ii. Fan speed

iii. Occupancy Mode Status

5. System controls:
    a. All systems shall be compatible with the third-party thermostats unless otherwise approved by LBUSD.
    b. Each indoor unit shall have the compatibility to be controlled with a third-party thermostat.
    c. VRF controller must allow all VRF points and specific alarm codes to be read and integrated to building automation system (BAS)
    d. VRF system must be able to read supply air temperature for the fan coils and integrated to building automation system (BAS).
    e. Factory installed microprocessor controls in the outdoor unit, and indoor units shall perform functions to efficiently operate the VRF system and communicate in a daisy chain configuration from outdoor unit to indoor units via RS485
    f. DDC Controllers (Only if approved by the district)
        i. Safety controls.
        ii. Scheduled controls.
        iii. Unoccupied period controls.
        iv. Supply fan controls.
        v. Refrigerant circuit controls.
        vi. Interface with District wide HVAC instrumentation and control energy management system
6. Condensate Pump
    a. Gravity Fed (if applicable)
    b. Little Giant (When gravity fed is not feasible\
    c. Mounting Requirements:
        i. Verify flow switch leveling
        ii. Mount with Unistrut to reduce vibration
        iii. Mounting bracket must not interfere with unit access doors
7. Drain System:
    a. Each indoor unit should come with a built-in secondary drain pan. If the unit does not come with a built-in secondary drain pan, a secondary drain pan must be added.
    b. All indoor units must have drains that shall be piped to an available sink.
8. System refrigerant: Follow the current refrigerant requirements per the EPA.
9. System refrigerant piping:

a. Arrangement: Arrange piping to interconnect indoor and outdoor unit(s) in compliance with manufacturer requirements and requirements indicated.

b. Routing: Conceal piping above ceilings and behind walls to maximum extent possible.

c. Isolation valves: Full port isolation ball valves with Schrader ports are required at branch boxes, controllers, and wyes, to allow isolation of refrigerant circuit components. Additionally, full port isolation ball valves with Schrader ports shall be placed both before and after branch boxes, branch controllers, and wyes. Ball valves to be installed so that the Schrader port is on the air handler / fan coil side of ball valve after the branch boxes, controllers, and wyes, and installed on the outdoor unit side of the branch boxes, controllers, and wyes.

d. Sizing: Size piping system, using a software program acceptable to manufacturer, to provide performance requirements indicated. Consider requirements to accommodate future change requirements.

e. Protection: Protection against mechanical and physical damage shall be installed over refrigerant piping at roof tops where piping is susceptible to being stepped on. No less than 16-gauge sheet metal line set cover is acceptable.

10. Specialty refrigerant pipe fittings.

a. The refrigerant circuit shall be constructed using field provided copper pipe together with manufacturer supplied Y- branches or header fittings connected to multiple (ducted, non-ducted or combination thereof) indoor units to effectively and efficiently distribute refrigerant between system components.

b. Each refrigerant pipe, y-branch, header kit, elbows and valves shall be individually insulated with no air gaps.

11. Oil Management

a. The system shall have an oil injection mechanism to ensure a consistent film of oil on all moving compressor parts at low speed.

b. The system shall have an oil return cycle algorithm which when activated opens all electronic expansion valves to flush oil back to compressors once every 3 hours.

12. Cabinet

a. Component cabinet shall be made of 20-gauge galvanized steel with a baked enamel finish (or similar approved).

b. All pipe connections, service, and maintenance access shall only be from front side of the unit.

c. Optionally, the cabinet shall be designed to also accept field provided refrigerant piping through the bottom of the unit.

C. Source Limitation: Obtain products from single source from single manufacturer including, but not limited to, the following:

1. Indoor and outdoor units, including accessories.
2. Branch Circuit Control Unit.
3. Controls and software.
4. Electronic expansion valves (EEVs.)
5. Refrigerant isolation valves.

D. PERFORMANCE REQUIREMENTS

1. Design complete and operational VRF HVAC system(s) complying with requirements indicated.
    a. Provide system refrigerant calculations.
        i. Refrigerant concentration limits shall be within allowable limits of ASHRAE 15 and governing codes.
        ii. Indicate compliance with manufacturer's maximum vertical and horizontal travel distances. Prepare a comparison table for each system showing calculated distances compared to manufacturer's maximum allowed distances.
2. Include a mechanical ventilation system and gas detection system as required to comply with ASHRAE 15 and governing codes.
3. Service Access:
    a. Provide and document service access requirements.
    b. Locate equipment, system isolation valves, and other system components that require service and inspection in easily accessible locations. Avoid locations that are difficult to access if possible.
    c. Where serviceable components are installed behind walls and above inaccessible ceilings, provide finished assembly with access doors or panels to gain access. Properly size the openings to allow for service, removal, and replacement.
    d. If less than full and unrestricted access is provided, locate components within 18 inches of the finished assembly.
    e. Where ladder access is required to service elevated components, provide an installation that provides for sufficient access within ladder manufacturer's written instructions for use.
    f. Comply with manufacturer requirement for clearances.
    g. The filter rack must open, at a minimum, ½ of the width of the filter plus 3 additional inches. Any exceptions submit Variance Request

h. Install filter return air grilles.

i. Comply with OSHA regulations.

4. System Design and Installation Requirements:

   a. Design and install systems indicated according to manufacturer's recommendations and written instructions.

   b. Where manufacturer's requirements differ from requirements indicated, contact LBUSD supervisor for direction. The most stringent requirements should apply unless otherwise directed in writing by LBUSD.

5. System Adaptability to Future Changes:

   a. Arrange and size system refrigerant piping to accommodate future changes to system without having to resize and replace existing refrigerant piping.

   b. Each branch circuit shall accommodate the addition of indoor units with unit capacity equal to average size indoor unit connected to the branch circuit.

6. Isolation of Equipment: Provide isolation valves to isolate each indoor and outdoor unit for service, removal, and replacement without interrupting system operation.

7. System Capacity Ratio: The sum of connected capacity of all indoor units shall be within the range of outdoor-unit rated capacity published by the manufacturer and not exceed the following:

   a. Not less than 50 percent.

   b. Not more than 130 percent.

   c. Range acceptable to manufacturer.

8. System Turndown: Stable operation down to 5 percent of outdoor-unit capacity.

9. Outdoor Conditions:

   a. Suitable for outdoor ambient conditions encountered.

      i. Design equipment and supports to withstand wind loads of governing code.

      ii. Provide corrosion-resistant coating for components and supports where located in coastal climates as they are known to be harmful to materials and finishes.

   b. Maximum System Operating Outdoor Temperature: 100°F

   c. Minimum System Operating Outdoor Temperature: 32°F

10. Seismic Performance: VRF HVAC system(s) shall withstand the effects of earthquake motions determined according to applicable code(s).

    a. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and remain operational.

11. Sound Performance: Sound levels generated by operating HVAC equipment shall be within requirements indicated:
    a. Indoor Unit: Within design guidelines of most recent ASHRAE HANDBOOK - HVAC Applications – Noise and Vibration Control
    b. Dedicated Outdoor Air Units – Dedicated outside air unit or outdoor air-source heat recovery units shall be rated in accordance with AHRI 350 (sound).
    c. Outdoor Unit - Heat Pump: Outdoor air-source heat pump units (individual modules) shall have a sound rating no higher than 65 dBA.
    d. Branch Control Unit - Branch Controllers: (individual modules) shall have a sound rating no higher than 50 dBA.
    e. Indoor Unit - Duct Free Units: (individual modules) shall have a minimum sound rating no higher than 30 dBA.
    f. Noise Criteria for Mechanical Systems:

Area	RC (NC)
General Office	30-40
Corridors	40-45
Public Spaces/Shops	40-45
Mechanical Areas	50
Dining/Common	40
Classrooms	30
Administration	30
Libraries/Performing Arts	25
Multipurpose/Gyms	45

12. Thermal Movements: Allow for controlled thermal movements from ambient, surface, and system temperature changes.
13. Capacities and Characteristics: As indicated on Drawings.

DIVISION 26 – ELECTRICAL

26 05 13 MEDIUM-VOLTAGE CABLES

Part 1 – General

A. Definition

1. Cables and related cable splices, terminations, and accessories for medium-voltage (2001 to 35,000 V) electrical distribution systems.

B. Related Sections

1. 26 05 26: Grounding and Bonding
2. 26 10 00: Service Entrance
3. 26 12 00: Medium Voltage Transformer
4. 26 13 00: Medium Voltage Metal Enclosed Load Interrupter

Part 2 – Products

A. Medium voltage cables

1. Medium-voltage cable shall be furnished where line-to-line operating voltage exceeds 600 volts. Cable shall be 15 KV, single conductor, 133 percent insulation level, ethylene propylene rubber insulated, shielded, PVC jacket Type MV-105.
2. Conductors shall be Class B stranded annealed, uncoated copper.

B. Conductor Insulation

1. Insulation system conductor screens, insulation and insulation screens shall be capable of continuous operation at conductor temperatures of 105 degrees C. and emergency overload temperatures of 140 degrees C.

C. Cable Terminations

1. Provide termination kits; meet Class 1 requirements capable of proper termination of 15 KV class single conductor cables.
2. Terminations for single conductor shielded cables consist of heat shrinkable stress control and other required non-tracking insulation tubing or tapes. Kits to contain high relative permittivity stress relief mastic for insulation shield cutback treatment with a heat-activated sealant for environmental sealing.

D. Cable Splices

1. Splice kit to be factory engineered kits that rebuild the cable insulation to that of the cable. Splices to contain necessary components to reinstate the cable's primary insulation, metallic shielding and grounding systems, and an outer jacket.
2. Splices shall be of uniform cross-section, heat shrinkable polymeric construction utilizing an impedance layer stress control tube and high dielectric strength insulating layers. Outer insulating layer shall be bonded to a conducting layer for shielding. The splice shall be re-jacketed with a heat shrinkable adhesive-lined sleeve to provide a waterproof seal, or factory approved taping kit such as Scotch 5717, or approved equal.
3. Splices shall accommodate a range of cable sizes and be completely independent of cable manufacturer tolerances. Splices shall be capable of being properly installed on out of round cable in accordance with ICEA and AEIC standards. Kits shall accommodate commercially available connectors.

4. Splices, which consist of 3 or more cables, shall be performed with 600 AMP Elastomold T Bodies, or approved equal. The splice shall be capable of removing or adding a conductor and restoring the connection in an electrically safe and waterproof condition. Installation of 200 AMP T Bodies is not permitted.

Part 3 – Execution

No specific LBUSD requirements.

26 05 19 LOW-VOLTAGE WIRES (600V AC)

Part 1 – General

A. Definition

1. Building wires and cables rated 600V and less. Connectors and cables rated 600V and less.

B. Related Sections

1. 26 05 23: Control-Voltage Electrical Power Cables

Part 2 – Products

A. Conductors and Cables

1. Use single conductor, annealed copper type THHN or THWN.
2. Provide stranded copper for all conductors

B. Conductor Insulation

1. Polyvinyl chloride and covered with a protective sheath of nylon, rated at 600 volts.

C. Conductor Identification

1. Markers to be Brady Perma-Sleeve, or approved equal.

Part 3 – Execution

No specific LBUSD requirements.

26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

Part 1 – General

A. Related Sections

1. 26 05 00: Common Work Results for Electrical.
2. 26 05 19: Low-Voltage Wires (600V AC)

3. 26 10 00: Service Entrance
4. 26 12 00: Medium Voltage Transformer
5. 26 24 13: Switchboards
6. 26 24 16: Panelboards
7. 26 26 00: Power Distribution Units
8. Division 27 – Communications

Part 2 – Products

A. Copper wire insulated for 600V; bare copper conductor.

B. Grounding electrode, copper-clad, ¾ inch diameter by 10 feet long ground rod.

C. Connectors

1. Copper, pressure type bolted connectors with two bolts, clamp type.
2. Welded connectors to be used with exothermic-welding kit.

D. Yard Box

1. Manufacturer
    1. Oldcastle Precast, Christy
    2. Jensen Precast
    3. Or Approved Equal.
2. Box: electrical precast concrete box, 22 inch wide by 35 inch long by 12 inch deep
    1. Basis of Design: Christy No. N36 Box
    2. Jensen, No. HN1730
3. Lids: to be locking lid covers, LockJaw, at all electrical utility boxes, 120 V and over, on campus, provided by the District as OFCI. Coordinate with District Representative.

Part 3 – Execution

A. Provide the services of an approved independent testing laboratory to test grounding resistance of "made" electrodes, ground rods, bonding of building steel, water pipes, gas pipes and other utility piping.

1. Test shall be performed in the presence of the Inspector.

26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

Part 1 – General

A. Related Sections

1. 26 05 00: Common Work Results for Electrical
2. 26 05 19: Low-Voltage Wires (600V AC)
3. 26 05 43: Underground Ducts and Raceways for Electrical Systems
4. 26 24 13: Switchboards
5. 26 24 16: Panelboards
6. 26 26 00: Power Distribution Units
7. Section 27 – Low Voltage Systems
8. 27 05 28: Pathways for Communications Systems
9. 28 05 28: Pathways for Electronic Safety and Security

Part 2 – Products

A. Metal Conduits, Tubing, and Fittings

1. Rigid metallic conduit to be rigid steel, heavy wall, mild steel, zinc-coated. Couplings, elbows, bends, condulets, bushings and other fittings shall be the same materials and finish as the rigid metallic conduit.
2. Electrical metallic tubing (EMT) to be steel tubing, zinc-coated with a protective enamel coating inside. Fittings, couplings, and connectors to be gland compression type. Set screw couplings and connectors not permitted.
3. Flexible steel conduit shall be of flexible interlocking strip construction with continuous zinc coating on strips. Required connectors and couplings fittings of the type, which threads into convolutions of flexible conduit.
4. Liquid-tight flexible metal conduit to be galvanized heavy wall, flexible locked steel strip construction, UV rated, with smooth moisture and oil-proof, abrasion-resistant, extruded plastic jacket. Connectors shall be as required for installation with liquid-tight flexible conduit and shall be installed to provide a liquid-tight connection.
5. Metal Clad (MC) cable system is not allowed.
6. Provide caps to plug all spare conduit.

B. Nonmetallic Conduits, Tubing, And Fittings

1. Non-metallic conduit to be rigid PVC electrical conduit extruded to schedule 40 dimensions of Type II. Grade 1 high impact, polyvinyl chloride, sweeps, couplings, reducers and terminating.
2. Provide caps to plug all spare conduit.

C. Metal Wireways and Auxiliary Gutters

1. Use 16 gage galvanized steel enclosed hinge/screw wiring troughs, surface metal raceway. Furnish with removable covers with keyholes slots to accept captive screws.

D. Surface Raceways

1. Non-metallic Wiremold 5500 Series, when applicable
2. Metallic Wiremold V700 Series, when applicable
3. Metallic Wiremold V2000 Series, when applicable
4. Manufacturers: Panduit, WireMold or Approved Equal

Part 3 – Execution

No specific LBUSD requirements.

26 05 36 CABLE TRAY FOR ELECTRICAL SYSTEMS

Part 1 – General

A. Related Sections

1. 27 05 36: Cable Trays for Communications Systems.

Part 2 – Products

A. Ladder Cable Trays

1. Two I-beam side rails with transverse rungs welded to side rails configuration.

B. Single-Rail Cable Tray

1. Central rail with extruded-aluminum rungs arranged symmetrically about the center rail configuration.

C. Trough Cable Tray

1. Two longitudinal members (side rails) with a solid sheet over rungs exposed on the interior of the trough, or corrugated sheet with both edges welded to the side rails configuration.

D. Cable Tray Accessories

1. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.
2. Barrier Strips: Same materials and finishes as for cable tray.

E. Cable Tray Grounding

1. Cable trays with electrical power conductors shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.
2. Cable trays with single-conductor power conductors shall be bonded together with a grounding conductor run in the tray along with the power conductors and bonded to the tray.

Part 3 – Execution

No specific LBUSD requirements.

26 09 23 LIGHTING CONTROL DEVICES

Part 1 – General

A. Related Sections

1. 23 09 00: Instrumentation and Control for HVAC
2. 26 05 00: Common Work Results for Electrical
3. 26 05 19: Low-Voltage Electrical Power Conductors and Cables
4. 26 05 53: Identification of Electrical Systems
5. 26 50 00: Lighting
6. Section 27 – Low Voltage Systems

B. Warranty

Note to Design Professional: Minimum 5 year's manufacturer's warranty on all hardware devices.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that applies to the specific project.

Part 2 – Products

A. Indoor Occupancy Sensors

1. Manufacturers:
   a. Lutron Electronics, Co., Inc http://www.lutron.com/en-US/pages/default.aspx
   b. Sensor Switch, Inc. https://sensorswitch.acuitybrands.com/
   c. The Watt Stopper http://www.wattstopper.com/
   d. Or Approved Equal
2. Ceiling-mounting, solid-state units with a separate relay unit.
   a. UL Listed and meet safety standards defined in NFPA 70, by a qualified testing agency, and marked for intended location and application, and shall comply with Title 24 requirements.
   b. Operation: Turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over 20 minutes or less.

c. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.

d. 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.

e. Mounting:

i. Sensor: Suitable for mounting in any position on a standard outlet box.

ii. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.

iii. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

f. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.

g. Bypass Switch: Override the on function in case of sensor failure.

h. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc keep lighting off when selected lighting level is present.

3. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.

a. 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.

b. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1,000 square feet when mounted on a 96-inch- high ceiling.

c. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot- high ceiling.

4. Ultrasonic Type: Ceiling mounting; detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage.

a. 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 per second.

b. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 square feet when mounted on a 96-inch high ceiling.

c. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1,000 square feet when mounted on a 96-inch high ceiling.

d. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2,000 square feet when mounted on a 96-inch high ceiling.

e. 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 by 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.
    a. Sensitivity Adjustment: Separate for each sensing technology.
    b. 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. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
    c. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 square feet (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

B. Wall- Mounted Indoor Occupancy Sensor
    1. Manufacturers
        a. Lutron Electronics, Co., Inc http://www.lutron.com/en-US/pages/default.aspx
        b. Sensor Switch, Inc. https://sensorswitch.acuitybrands.com/
        c. The Watt Stopper http://www.wattstopper.com/
        d. Or Approved Equal
    2. Automatic wall switch occupancy sensor, suitable for mounting in a single gang switchbox
    3. UL Listed and meet safety standards defined in NFPA 70, by a qualified testing agency, and marked for intended location and application, and shall comply with Title 24 requirements.
    4. Standard Range: 180-degree field of view with a minimum coverage of 1000 sq, ft.
    5. Sensing Technology: Dual technology Type (PIR and Ultrasonic)
    6. Concealed, field adjustable, “off” time delay selector at up to 20 minutes

C. Emergency Shunt Relay
    1. Manufacturer:
        a. Lighting Control and Design, Inc. http://www.lightingcontrols.com/index.asp
        b. Or Approved Equal
    2. Description: Normally closed, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.
        e. Coil Rating: 277V.

D. Conductors and Cables

7. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
8. Class 1 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
9. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.

Part 3 – Execution

A. Identification

1. Identify components and power and control wiring according to Section 26 05 53 Identification for Electrical Systems.
2. Identify controlled circuits in lighting contactors.
3. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.
4. Label time switches and contactors with a unique designation.

26 10 00 SERVICE ENTRANCE

Part 1 – General

A. Related Sections

1. 03 30 00: Cast-In-Place Concrete.
2. 26 05 00: Common Work Results for Electrical.
3. 31 23 00: Excavation and Backfill.

Part 2 – Products

A. Materials

1. Transformer Pads: Concrete transformer pads shall meet requirements of serving electric utility company.

Part 3 – Execution

A. Comply with requirements of utility company having jurisdiction. Install transformer vault, outdoor transformer enclosure, pad and slab box, manholes or other equipment pertaining to service.

B. Consult utility company to determine exact location of serving point or service poles, quadrants on poles for service risers and work and material.

C. Interrupting capacity of main circuit breaker and distribution circuit breakers shall be equal to or greater than available short-circuit current at point as obtained by utility company. Selective coordination between main and feeder circuit breakers is required.

D. Service conduits shall terminate at service poles or other service point, as indicated on Drawings and shall extend underground to main service terminating pull section as indicated. Bends in conduits shall be long radius type and sweeps shall have a radius of not less than 10 times conduit trade size. Underground conduits shall be concrete encased on all sides, 4 inch minimum, with multiple conduits spaced not less than 1-1/2 inches apart and with red marker tape 12 inches below grade, or use utility company recommended spacing, whichever is greater. Provide support for conduits to prevent floating when encased.

26 12 00 MEDIUM-VOLTAGE TRANSFORMERS

Part 1 – General

A. Related Sections

1. 26 05 00: Common Work Results for Electrical.
2. 26 50 00: Lighting
3. 26 05 48: Vibration and Seismic Controls for Electrical Systems
4. Division 27 – Communications
5. 31 23 00: Excavation and Backfill

B. Reference Standards

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 IEEE C2 and NFPA 70.
3. Comply with ANSI C57.12.28, IEEE C57.12.10, IEEE C57.12.70, and IEEE C57.12.80.

C. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

1. Acme Electric Corporation http://www.acmepowerdist.com/
2. Cooper Industries http://www.cooperindustries.com/content/public/en/lighting/controls.html

3. Cutler-Hammer http://www.cutler-hammer.ca/
4. GE Electrical Distribution and Control http://www.ge.com/index.html
5. Hammond Manufacturing http://www.hammondmfg.com/
6. Siemens Energy and Automation, Inc. http://www.sea.siemens.com/us/home/Pages/Home.aspx
7. Square D/Schneider Electric http://www.schneider-electric.com/site/home/index.cfm/us/
8. Or Approved Equal

Part 3 – Execution

No specific LBUSD requirements.

26 24 13 SWITCHBOARDS

Part 1 – General

A. Related Documents
   1. 26 05 00: Common Work Results for Electrical
   2. 26 05 33: Raceways and Boxes Fitting and Supports
   3. 26 05 48: Vibration and Seismic Controls for Electrical Systems

B. Submittals
   1. Product Data: For each type of switchboard, over-current protective device, transient voltage suppression device, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

Part 2 – Products

A. Manufacturers
   1. Eaton https://www.eaton.com
   2. Square D https://www.se.com/us/en/
   3. Siemens https://new.siemens.com/us/en.html
   4. Or Approved Equal

B. Performance Requirements
   1. Seismic Performance: Switchboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

C. Front-Connected, Front-Accessible Switchboards:

1. Main Devices: Panel, Fixed, individually mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned.

D. Front- and Side-Accessible Switchboards:

1. Main Devices: Fixed, individually mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned.

E. Front- and Rear-Accessible Switchboards:

1. Main Devices: Fixed, individually mounted.
2. Branch Devices: Panel, Fixed, individually mounted.
3. Sections Front aligned.

F. Bussing: Bussing shall be copper, no aluminum bussing.

G. Seismic Requirements: Fabricate and test switchboards according to IEEE 344 to withstand seismic forces defined in Section 26 05 48 Vibration and Seismic Controls for Electrical Systems.

H. Indoor Enclosures: Steel, NEMA 250, Type 1

I. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.

1. Finish: Factory-applied finish in manufacturer's standard color; undersurfaces treated with corrosion-resistant undercoating.
2. Enclosure: Flat roof; bolt-on rear covers for each section, with provisions for padlocking.
3. Power for space heaters, ventilation, lighting, and receptacle provided by a remote source.

J. Customer Metering Compartment: A separate customer metering compartment and section with front hinged door, for indicated metering-digital metering unit (DMU), and current transformers for each meter. Current transformer secondary wiring shall be terminated on shorting-type terminal blocks. Include potential transformers having primary and secondary fuses with disconnecting means and secondary wiring terminated on terminal blocks.

K. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

L. Removable, Hinged Rear Doors and Compartment Covers: Secured by captive thumb screws standard bolts for access to rear interior of switchboard.

M. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

N. Pull Box on Top of Switchboard:

1. Adequate ventilation to maintain temperature in pull box within same limits as switchboard.

2. Set back from front to clear circuit-breaker removal mechanism.
3. Removable covers shall form top, front, and sides. Top covers at rear shall be easily removable for drilling and cutting.
4. Bottom shall be insulating, fire-resistive material with separate holes for cable drops into switchboard.
5. Cable supports shall be arranged to facilitate cabling and adequate to support cables indicated, including those for future installation.

Part 3 – Execution

No specific LBUSD requirements.

26 24 16 PANELBOARDS

Part 1 – General

A. Related Documents
   1. 26 05 00: Common Work Results for Electrical
   2. 26 05 33: Raceways and Boxes Fitting and Supports

B. Submittals
   1. Detail bus configuration.
   2. Short-circuit current rating of panelboards and overcurrent protective devices.
   3. Include evidence of NRTL listing for series rating of installed devices.
   4. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

Part 2 – Products

A. Manufacturers
   1. Square D http://www.schneider-electric.com/products/us/en/52100-panelboards/
   2. General Electric Corporation http://www.ge.com/index.html
   3. Siemens http://www.usa.siemens.com/entry/en/index.htm?stc=usccc020189
   4. Or Approved Equal

B. Panelboards
   1. Doors: Secured with vault-type latch with tumbler lock; keyed alike. For doors more than 36 high, provide two latches, keyed alike.
   2. Bussing: All bussing shall be copper, no aluminum bussing.

3. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
4. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
5. Branch Overcurrent Protective Devices: Circuit breakers
6. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.

C. Lighting And Appliance Branch-Circuit Panelboards

1. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
2. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
3. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

D. Disconnecting and Overcurrent Protective Devices

1. Molded-Case Circuit Breaker (MCCB):
2. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
3. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
4. Only thermal-magnetic circuit breakers are acceptable as basis of design. Avoid electronic trip breakers unless authorized by District Representative, submit Variance Request.
5. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
6. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
7. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
8. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
9. Lugs: Compression style
10. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
11. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.

12. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
13. Zone-Selective Interlocking: Integral with electronic trip unit (avoid electronic trip breakers unless authorized by District Representative, submit Variance Request); for interlocking ground-fault protection function with other upstream or downstream devices.

E. Panelboard Cabinets:

Note to Design Professional: For exterior mounted cabinets or cabinets accessible to students and general public, cabinets shall be lockable in the on-position.

Part 3 – Execution

No specific LBUSD requirements.

26 24 19 MOTOR-CONTROL CENTERS

Part 1 – General

A. Related Sections
   1. 26 05 00: Common Work Results for Electrical.

B. Reference Standards
   1. General Requirements for MCCs: Comply with NEMA ICS 18 and UL 845.

Part 2 – Products

A. Manufacturers
   1. ABB http://www.abb.com/
   2. General Electric Corp. http://www.ge.com/index.html
   3. Rockwell Automation, Inc. http://www.rockwellautomation.com/
   4. Or Approved Equal

B. Performance Requirements
   1. Seismic Performance: MCCs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Incoming Mains
   1. Main Lugs
      a. Material: Hard-drawn copper, 98 percent conductivity. Main and Neutral Lugs: Mechanical type.

D. MCCB

1. Thermal-Magnetic Circuit Breakers
2. Electronic trip circuit breakers with RMS sensing, instantaneous trip.

E. Combination Controllers

1. Full-Voltage Controllers:
    a. Magnetic Controllers: Full voltage, across the line, electrically held.
2. Reduced-Voltage, Solid-State Controllers:
    a. Comply with UL 508.
    b. Reduced-Voltage, Solid-State Controllers: An integrated unit with power SCRs, heat sink, microprocessor logic board, digital display and keypad, bypass contactor, and overload relay.
        i. Starting Mode: Voltage ramping
        ii. Stopping Mode: Coast to stop
        iii. Shorting (Bypass) Contactor: Operates automatically when full voltage is applied to motor, and bypasses the SCRs. Solid-state controller protective features shall remain active when the shorting contactor is in the bypass mode.
        iv. Shorting Contactor Coils: Pressure-encapsulated type; manufacturer's standard operating voltage, matching control power or line voltage, depending on contactor size and line-voltage rating.
        v. Logic Board: Identical for all ampere ratings and voltage classes, with environmental protective coating.
        vi. Adjustable acceleration-rate control using voltage or current ramp, and adjustable starting torque control with up to 400 percent current limitation for 20 seconds.
        vii. SCR bridge shall consist of at least two SCRs per phase, providing stable and smooth acceleration without external feedback from the motor or driven equipment.
        viii. Keypad, front accessible; for programming the controller parameters, functions, and features; shall be manufacturer's standard and include not less than the following functions:
        ix. Digital display, front accessible; for showing motor, controller, and fault status; shall be manufacturer's standard and include not less than the following:
3. Multispeed Magnetic Controllers: Multispeed Magnetic Controllers: Two speed, full voltage, across the line, electrically held. Compelling relay to ensure that motor will start only at low speed.
4. Disconnecting Means and OCPDs

a. Fusible Disconnecting Means:
    i. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate fuses.
    ii. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
b. MCP Disconnecting Means:
    i. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
    ii. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
    iii. Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
    iv. Alarm contact that operates only when MCP has tripped.
c. MCCB Disconnecting Means:
    i. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
    ii. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
    iii. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
    iv. Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
    v. Alarm contact that operates only when MCCB has tripped.
d. Molded-Case Switch Disconnecting Means:
    i. UL 489, NEMA AB 1, and NEMA AB 3, with in-line fuse block for Class J or L power fuses (depending on ampere rating), providing an interrupting capacity to comply with available fault currents; MCCB with fixed, high-set instantaneous trip only.
    ii. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
    iii. Auxiliary contacts "a" and "b" arranged to activate with molded-case switch handle.

Part 3 – Execution

No specific LBUSD requirements.

26 26 00 POWER DISTRIBUTION UNITS

Part 1 – General

A. Related Sections

1. 26 05 00: Common Work Results for Electrical.
2. 26 05 48: Vibration and Seismic Controls for Electrical Systems
3. 26 50 00: Lighting
4. Division 27 – Communications

B. Reference Standards

1. Provide units that are constructed to withstand seismic forces specified in Section 26 05 48 Vibration and Seismic Controls for Electrical Systems.

Part 2 – Products

A. Manufacturers

1. Controlled Power Company http://www.controlledpwr.com/
2. Tripp Lite http://www.tripplite.com/
3. Myers Power Products, Inc. http://myerspowerproducts.com/
4. Power Distribution, Inc. http://www.pdicorp.com/
5. Square D; Schneider Electric http://www.schneiderelectric.com/site/home/index.cfm/us/
6. United Power http://www.unitedpower.com/home.aspx
7. Or Approved Equal

B. Units

1. Input-power, circuit-breaker section.
2. Isolation transformer.
3. TVSS system.
4. Output panelboard(s).
5. Alarm, monitoring, and control system.
6. Unit Capacity Rating: Unit shall carry indicated rms kilovolt-ampere load continuously without exceeding rated insulation temperature for the following input voltage and load current:
    a. Input Voltage: Within rated input-voltage tolerance band of unit.
    b. Load Current: Minimum of 3.0 crest factor and 85 percent total harmonic distortion.

C. Input-Power, Circuit-Breaker Section

1. Three-pole, shunt-tripped, thermal-magnetic-type circuit breaker, rated for indicated interrupting capacity and 125 percent of input current of unit at 100 percent rated load.

D. Isolation Transformer Section

1. Description: Dry-type, electrostatically shielded, three-phase, common-core, convection-air-cooled isolation transformer, copper windings. Comply with UL 1561

E. TVSS System

1. Description: Integrated TVSS system to protect unit panel board. Disconnect Device: Manual, three-pole, fused disconnect switch. Fuses are rated at 200-kA interrupting capacity.

F. Power Distribution Unit Controls

1. Emergency, power-off input terminals for connection to remote power-off switch.
2. Remote Power-Off Control: Control circuit with connection to shunt trip of power distribution unit main power circuit breaker and terminals for connection to one or more remote power-off, push-button stations.

Part 3 – Execution

No specific LBUSD requirements.

26 27 26 WIRING DEVICES

Part 1 – General

A. Related Sections

1. 26 05 00: Common Work Results for Electrical.
2. 26 05 13: Medium-Voltage Cables
3. 26 50 00: Lighting

Part 2 – Products

A. Manufacturers

1. Hubbell https://www.hubbell.com/wiringdevice-kellems/en/
2. Leviton https://www.leviton.com/en
3. Pass & Seymour https://www.legrand.us/passandseymour.aspx

B. Straight-Blade Receptacles

1. Duplex GFCI Convenience Receptacles

i. 125 V, 20 Amp. Continuous self-testing. Meets U.L. 498 for receptacles, UL 943 class A for GFCIs UL file number E41978. Complies with NEC and CEC requirements, NEMA WD-6 ANSI 73.Suitable for use with stranded copper conductors.

ii. Basis-of-Design Product: Subject to compliance with requirements, provide Hubbell Incorporated; Wiring Device-Kellems; GFRST20 or a comparable product by one of the following:

iii. Or Approved equal

iv.

2. Convenience Receptacles

i. Heavy Duty 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.Flammability rating 94 V2.Brass center assembly rivet, and automatic self-grounding. Suitable for use with stranded conductors.

ii. Basis-of-Design Product: Subject to compliance with requirements, provide Hubbell Incorporated; Wiring Device-Kellems; HBL 5352 (duplex), or a comparable product by one of the following:

iii. Or Approved equal

C. Toggle Switches

1. Comply with NEMA WD 1, UL 20, and FS W-S-896. Suitable for use with stranded copper conductors.

2. Switches, 120/277 V, 20 A:

i. Single Pole:

ii. Basis-of-Design Product: Subject to compliance with requirements, provide **Hubbell Incorporated; Wiring Device-Kellems; HBL 1221** or a comparable product by one of the following:

iii. Or Approved equal

26 29 23 VARIABLE FREQUENCY MOTOR CONTROLLERS

Part 1 – General

A. Related Sections

1. Division 22 – Plumbing
2. Division 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
3. 26 05 00: Common Work Results for Electrical
4. Division 27 – Communications

B. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufactures

1. ABB http://www.abb.com/
2. Allen-Bradley http://ab.rockwellautomation.com/
3. Yaskawa America, Inc. http://www.yaskawa.com/site/Home.nsf/home/home.html
4. Toshiba http://www.toshiba.com/tai/
5. Or Approved Equal

Part 3 – Execution

A. Start-Up and Commissioning Service: The manufacturer shall provide start-up commissioning of the variable frequency drive and its optional circuits by a factory certified service technicians.

26 32 13 ENGINE GENERATORS

Part 1 – General

E. Related Sections

5. 26 05 00: Common Work Results for Electrical.
6. 26 05 26: Grounding and Bonding
7. 26 10 00: Service Entrance
8. 26 12 00: Medium Voltage Transformers
9. 26 24 13: Switchboards
10. 26 24 16: Panelboards
11. Division 27 – Communications

F. Air Pollution Management District (SCAQMD)

13. The engine generator shall be a current EPA certified engine and equipped with the necessary devices and systems to meet current SCAQMD regulations for the operation of a standby diesel generator.
14. The Contractor shall obtain general permit registration, submit application, pay for, and obtain a SCAQMD permit to construct and operate the standby generator.
15. Contractor shall fill out the permit application, as requested by the District Representative with assistance from the District.

16. Contractor must have a copy of the permit in their possession, prior to on site delivery of the backup generator.

G. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

E. Manufacturers

6. Caterpillar http://www.cat.com/cda/layout?l=7&m=37532&x=7
7. Generac Power Systems, Inc. http://www.generac.com/
8. Onan/Cummins Power Generation http://www.cumminsonan.com/
9. Spectrum Detroit Diesel http://detroitdiesel.com/
10. Or Approved Equal

F. Engine

13. Fuel: Diesel fuel oil, Grade DF-2. Provide a full tank, after testing is complete.
14. Rated Engine Speed: 1800 rpm.
15. Maximum Piston Speed for Four-Cycle Engines: 2250 FPM.
16. Main Fuel Pump: Mounted on engine
17. Cooling System: Closed loop, liquid cooled, with radiator.
    a. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water.
    b. Temperature Control: Self-contained, thermostatic-control valve.
18. Fuel Oil Storage
    a. Provide a UL142 generator set base mounted, double wall belly fuel tank constructed of welded steel. Interior of tank shall be finished with a rust preventative coating. Tank shall be complete with rupture basin, level gauge, low-level fuel alarm contacts, and fuel in rupture basin alarm contacts. Alarm contacts shall be wired and annunciated on the control panel and remote annunciator. Provide 24 hour fuel supply, min. Verify fuel supply with District.
19. Outdoor Generator-Set Enclosure
    a. House generator in a factory fit sound attenuated NEMA 3R enclosure. The sound level shall be 72 dBa at 23 feet at full load. Provide factory certification of sound level.

Part 3 – Execution

A. Training

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Provide two separate training days of instruction to the Owner's personnel.

26 33 23 CENTRAL BATTERY INVERTER EQUIPMENT

Part 1 – General

A. Related Sections

1. 26 05 00: Common Work Results for Electrical.
2. 26 50 00: Lighting

B. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Centralized Inverter Manufacturers

1. Myers Emergency Power Systems https://www.myerseps.com/
2. Lithonia Lighting https://lithonia.acuitybrands.com/ Thomas and Betts
3. Thomas and Betts http://www.tnb.com/pub/index.php

26 36 00 TRANSFER SWITCHES

Part 1 – General

C. Related Sections

3. 26 05 00: Common Work Results for Electrical.
4. 26 05 26: Grounding and Bonding
5. 26 10 00: Service Entrance
6. 26 12 00: Medium Voltage Transformers
7. 26 24 13: Switchboards
8. 26 32 13: Engine Generators

D. Warranty

Note to Design Professional: Require manufacturer's warranty.

Part 2 – Products

A. Manufacturers

1. AC Data Systems, Inc. http://www.acdata.com/
2. Caterpillar http://www.cat.com/cda/layout?l=7&m=37532&x=7
3. Emerson; ASCO Power Technologies, LP. http://www.asco.com/
4. Generac Power Systems, Inc. http://www.generac.com/
5. GE Zenith Controls http://www.geindustrial.com/cwc/electrical_homepage.htm
6. Kohler Power Systems; Generator Division http://www.kohler.com/corporate/business/engines-and-generators.html
7. Onan/Cummins Power Generation; Industrial Business Group http://www.cumminsonan.com/
8. Spectrum Detroit Diesel http://detroitdiesel.com/
9. Or Approved Equal

B. Automatic Transfer-Switch

1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value.
2. Adjustable Time Delay: Adjustable from zero to six seconds, and factory set for one second.
3. Voltage/Frequency Lockout Relay: Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent.
4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes.
5. Test Switch.
6. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
7. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
8. Transfer Override Switch: Pilot light indicates override status.
9. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
10. Engine-Generator Exerciser: Solid-state, programmable-time switch.
11. Exerciser Transfer Selector Switch.
12. Integral battery operation of time switch when normal control power is not available.

Part 3 – Execution

A. Installation

1. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

B. Training

Note to Design Professional: Coordinate this training with that for generator equipment.

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.

26 50 00 LIGHTING

Note to Design Professional: Design teams to propose LED fixture specifications and present lighting schedule to the District for approval.

Part 1 – General

A. Warranty

Note to Design Professional: minimum 10 years manufacturer's warranties required.

Part 2 – Products

B. Manufacturers

1. ATG Electronics Inc. www.atgelectronics.com
2. MaxLite Inc. www.maxlite.com
3. Litetronics International, Inc. www.litetronics.com
4. Or Approved Equal

LBUSD will guide in the selection of the lighting fixtures on a site per site basis.

C. Light Fixtures

1. Performance: Refer to most updated DLC and QPL requirement: www.designlights.org/search\
2. Must bear UL or ITSNA (formerly ETL) label
3. Must be part of Design Lights Consortium's (DLC's) Qualified Product List (QPL) and meet most recent DLC Technical Requirements. https://www.designlights.org/
4. Diode banks: Replaceable whenever possible
5. Driver: Must be easily accessible
6. Kelvin temperature (Interior Lighting): 4000K
7. Kelvin temperature (Exterior Lighting): 4000K unless otherwise specified by the district.
8. All 2 X 4, 1 X 2 and 2 X 2 Troffers for new construction or retrofits shall not exceed 30 Watts input per fixture unless approved by the district.

9. Color Rendering Index: 80+ min.
10. ROHS Compliant: restricting the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers.
11. Foot candles shall not exceed the Median/Average recommended by The Illuminating Engineering Society (IES), foot candles should fall between the minimum and the Median. Please refer to most updated recommendations from IES at https://www.ies.org/

Part 3 – Execution

A. Installation

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Comply with NFPA 70 for minimum fixture supports.

C. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.

2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Field Quality Control

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Inspect each installed fixture for damage. Replace damaged fixtures and components.

C. Illumination Observations: For exterior lighting, verify normal operation of lighting units after installing luminaire and energizing circuits with normal power source.

1. Verify operation of photoelectric controls.

D. Illumination Tests (Exterior Lighting Only):

1. Measure light intensities at night. Tests shall be witnessed by Architect and/or Owner's representative. Provide two (2) weeks advance notice. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):

2. IESNA LM-72, "Directional Positioning of Photometric Data."

E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

C. Training

A. Train Owner's Maintenance Personnel to adjust, operate, and maintain luminaire devices.

26 55 61 THEATRICAL LIGHTING AND STAGE DIMMING SYSTEM

Part 1 – General

A. Related Sections

1. 26 05 00: Common Work Results for Electrical.
2. 26 05 26: Grounding and Bonding
3. 26 10 00: Service Entrance
4. 26 12 00: Medium Voltage Transformers
5. 26 24 13: Switchboards

B. Warranty

Note to Design Professional: Require manufacturer's warranties.

C. Commissioning

Note to Design Professional: Coordinate and specify commissioning requirements that applies to the specific project if Construction Commissioning is determined as necessary by designated District Representative.

Part 2 – Products

A. Manufactures

1. Electronic Theatre Control (ETC) http://www.etcconnect.com
2. Leviton http://www.leviton.com
3. Or Approved Equal

LBUSD can guide in the selection of the lighting fixtures on a site per site basis.

B. Dimmer Racks

1. Freestanding dead-front switchboards. Exterior surfaces shall be finished in black powder coat.
2. Racks shall be designed to allow for adjacent or back-to-back mounting. Rear sections of racks behind dimmer modules shall be utilized wireways. Removable conduit panels shall be provided on both top and bottom of racks.
3. Racks shall be designed to operate at 208/120 volts and either single-phase or 3-phase power. Removable panels shall be provided on the sides of the rack to allow simple rack-to-rack busing.

4. Racks shall be factory-tested and control modules shall be burned-in at elevated temperatures for a minimum of 24 hours. Racks shall be UL listed and shall have a minimum interrupting capacity of 10,000 amps.
5. Dimmers within racks shall allow for selectable panic operation through external dry contact closures.

C. Dimmers

1. Plug-in modules shall consist of die-cast aluminum chassis containing one or 2 circuit breakers, solid-state power devices, high-speed processors and 2 filter chokes.
2. Dimmer modules shall include high quality toroidal filter chokes to limit objectionable harmonics, radiated radio frequencies, electromagnetic interference on conductors and acoustical noise in load lamp filament. Current rise time shall be measured at 90 degrees conductive angle from 10 percent to 90 percent of output waveform. Rise time of dimmer shall not vary by over 10 percent operating at 25 percent to 100 percent of rated load. Rise time of stage dimmers shall be no less than 350 microseconds. Rise time of house dimmers shall be not less than 800 microseconds.
3. Power efficiency of dimming channels shall be at least 95 percent, or 97 percent at full load, depending on rise time of modules.
4. Dual dimmer modules shall be Strand 2.4 KW, CD80SV, 72314.
5. Dimmer modules shall be UL and cUL listed.
6. Provide forward or reverse-phase angle dimming for LEDs and electronic low-voltage transformers

D. Control Modules

1. Control modules shall be plug-in assembly consisting of formed steel chassis, one glass epoxy printed circuit board, and 2 levers for easy tool-free insertion and removal. Control modules shall contain LEDs providing user feedback. Control modules shall be Strand CD 80 SV Series.
2. Provide 48-module racks requiring one control module per rack. Slots shall be provided in racks for fully redundant, on-line backup control modules.
3. Control modules shall accept 2 input control signals of either industry standard DMX512 or Strand AMX protocols. Network interfaces for dimmers and feedback data shall be provided. Control module front panels shall provide RS232 serial ports and hand-held terminal ports.

E. Control Consoles: Control consoles shall be microprocessor-based lighting control systems. Control consoles shall provide for control of up to 512 dimmers on a maximum of 125 control channels with at least 200 cues. Output shall be user-selectable between digital (CMX) and USITT standard (DMX512) and Strand (AMX).

F. Entrance Stations: Entrance stations shall be Strand No. 63021 having full on/off functions with LED to indicate on status. Stations shall be wired with 6-conductor, 20AWG, stranded, unshielded cables.

G. Border lights:

1. Optical train shall consist of medium screw base PAR38 or R40 reflector lamps. Unit may also be provided with general service A-Lamps with Alzak reflectors. Compartments shall accommodate combination filter holders for color gels or 5-5/8 inch diameter glass roundels.

H. Plug-In Boxes: Plug-in boxes shall be Strand 9600 Series.

1. Plug-in boxes shall be formed of 18 gage painted steel with a removable cover plate. Plug-in box shall contain TLG receptacles on 18-inch S-cable pigtails with strain relief fittings.

Part 3 – Execution

A. Deliver the operating and servicing manual for stage lighting and dimmer system to the District.

B. Training

1. Instruct the District in the correct operation of system.

2. Manufacturer of dimming system shall provide an engineering representative on-site, after installation has been completed to instruct District's personnel in the operation and maintenance of system. Instruction time shall not be less than 2 days.

DIVISION 31 – EARTHWORK

31 22 00 GRADING

Part 1 – General

A. If Contractor encounters any suspected cultural resource, or unique archaeological or paleontological resource, during the course of construction, the Contractor shall halt or divert work and notify the District Representative immediately. The District will evaluate the situation and if warranted, will consult with a qualified archeologist or paleontologist to determine further actions.

B. If human remains are encountered unexpectedly during construction excavation and grading activities, the State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98, and the Contractor will notify the District Representative immediately. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the Native American Heritage Commission.

Part 2 – Products

No specific LBUSD requirements.

Part 3 – Execution

No specific LBUSD requirements

31 23 00 EXCAVATION AND BACKFILL

Part 1 – General

No specific LBUSD requirements.

Part 2 – Products

Note to Design Professional: Slurry backfill within public roadway sections will be specified as necessary. Native soil is the District preferred backfill to avoid materials export.

Part 3 – Execution

Note to Design Professional: Recycled use of crushed existing concrete structures on site is prohibited.

A. The backfill and compaction of trenches in traffic areas must be in the presence of the Project Inspector or Geotechnical Engineer.

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 11 00 BASE COURSE

Part 1 – General

A. Related Sections
   1. 01 45 24: Environmental Import Materials Testing
   2. 01 45 25: Environmental Export Materials Testing
   3. 31 23 00: Excavation and Fill
   4. 32 12 16: Asphalt Paving
   5. 32 12 36: Seal Coats
   6. 32 14 13.13: Interlocking Concrete Pavers

B. Reference Standards
   1. Conform to Section 200,2.2 of the Standard Specifications for Public Works Construction.
   2. Conform to site specific geotechnical report for specified thickness.

Part 2 – Products

Note to Design Professional: Recycled use of crushed existing concrete structures on site is prohibited.

A. Base Material

1. Use crushed aggregate base (CAB). Crushed miscellaneous base is not acceptable.
2. Crushed Aggregate Base Material shall conform to with the requirements of Standard Specifications for Public Works Construction, Section 200 – Rock Materials
3. All import material must meet Department of Toxic Substance Control (DTSC) requirements. The District has experience with a few of the larger facilities for the import of construction materials that have been tested and accepted. For a current list of those facilities contact the District.

Part 3 – Execution

A. Install aggregate base course material in layers not exceeding 4-inches

B. Compact per the requirements of the soils report and drawings, or 95 percent if not noted.

32 12 16 ASPHALT PAVING

Part 1 – General

A. Related Sections

1. 01 45 24: Environmental Import Materials Testing
2. 01 45 25: Environmental Export Materials Testing
3. 31 23 00: Excavation and Fill
4. 32 11 00: Base Course
5. 32 12 36: Seal Coat
6. 32 17 23: Pavement Markings

B. Reference Standards

1. Greenbook Standard Specifications

C. Warranty:

Note to Design Professional: Require manufacturer's warranty against "aligatoring" and settlement.

Part 2 – Products

A. Asphalt: hot plant mix.

B. Mix: Traffic areas Type C2 dense medium; berms and ramps, Type D1.

C. Pressure treated redwood stake dividers, when concrete mow strip is not feasible.

D. Herbicide is to be used as a last resort following HSA and IPM (Integrated Pest Management) District Standards. The link Contractor shall obtain District approval prior to any herbicide use. Reach out to the District representative for the IPM plan if needed. If needed, herbicide: Commercial chemical for weed control, registered by the EPA and must comply with HSA. District approval of product required. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, complying with AASHTO M 248.

Part 3 – Execution

A. Tolerances: within 1/8 inch of design thickness and 1/8 from design elevation.

B. If herbicide has been District approved, place herbicide prior to pour.

C. Maximum lift of asphalt: 3 inches.

D. Patching

1. Use hot-mix asphalt paving only. Cold patch is not acceptable.
2. Saw cut perimeter of patch and excavate existing pavement section to sound base extending 12 inches into adjacent sound pavement,
3. Re-compact existing unbound-aggregate base course to form new subgrade.
4. Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.
5. Thickness of base and paving section is to match patched section, or 3 inches of asphalt over 8 inches of base, whichever is greater.
6. Restripe areas of patched areas to match existing.

32 12 36 SEAL COATS

Part 1 – General

A. Scope: Bituminous sealant for asphalt concrete surfacing.

B. Related Sections

1. 01 45 24: Environmental Import Materials Testing
2. 01 45 25: Environmental Export Materials Testing
3. 31 23 00: Excavation and Fill
4. 32 11 00: Base Course
5. 32 12 16: Asphalt Paving
6. 32 17 23: Pavement Markings

C. Reference Standards

1. Conform to Section 203 and 302 of the Standard Specifications for Public Works Construction.
2. Comply with International Slurry Surfacing Association (ISSA) performance guidelines.

Part 2 – Products

A. Manufacturer
   1. Crack Sealing
      a. CalSeal Modified Asphalt joint sealant as manufactured by Henry Inc., Crafco Polyflex Type 3.
      b. Or Approved Equal

B. Petroleum Based Emulsified Asphalt
   1. The emulsified asphalt shall conform to Grade SS-1, SS-1h, CSS-1h, or CQS-1h, (Quick setting grade) as specified in ASTM D977 and AASHTO M140.

C. Aggregate
   1. Type I slurry seal gradation shall be used for non-vehicle use areas.
   2. Type II slurry seal gradation shall be used for parking lots and vehicle use areas.

D. Additives
   1. Additives may be used to accelerate or retard the break set of the slurry and improve the resulting finished surface.

Part 3 – Execution

Note to Design Professional: Apply two coats of sealer over new asphalt, one coat over existing or patched asphalt.

A. Type I Seal coat shall be applied at the rate of 8-12 pounds per square yard.

B. Type II Seal coat shall be applied at the rate of 12-20 pounds per square yard.

32 14 13.13 INTERLOCKING CONCRETE PAVERS

Part 1 – General

A. Related Sections
   1. 01 45 24: Environmental Import Materials Testing
   2. 01 45 25: Environmental Export Materials Testing
   3. 03 33 00: Cast in Place Concrete
   4. 32 11 00: Base Course

5. 32 12 16: Asphalt Paving
6. 32 13 13: Site Concrete
7. 32 90 00: Planting

B. Reference Standards

1. Interlocking Concrete Pavement Institute http://www.icpi.org

C. Submittals

1. Provide shop drawings showing pattern and edge conditions.

Part 2 – Products

A. Manufacturers

1. Olsen Paving Stones http://www.olsenpavingstone.com
2. Orco Block http://orco.com
3. Acker-Stone Company http://ackerstone.com/
4. Or Approved Equal

B. Product

Note to Design Professional: Pattern, size and color to be selected from manufacturer's standards.

1. Concrete pavers, 3 1/8 inch thick, 8,000 PSI

Part 3 – Execution

Note to Design Professional: Do not install over concrete sub base. Consult geotechnical report for section properties.

32 17 26 TACTILE WARNING SURFACE

Part 1 – General

A. Submittals

1. Product data.
2. Samples.
3. Provide shop drawings showing attachment details and edge conditions.

B. Warranty

Note to Design Professional: Require manufacturer's warranties.

Part 2 – Products

A. Manufacturer

1. Armor-Tile Tactile Systems
2. Or Approved Equal

Note to Design Professional: The District preference is for cast in place systems. Specify the Cast In Place System at new, concrete and asphalt applications.

Part 3 – Execution

No specific LBUSD requirements.

32 18 16.13 PLAYGROUND PROTECTIVE SURFACING

Part 1 – General

A. Related Sections

1. 11 68 00: Playfield Equipment and Structures
2. 32 12 16: Asphalt Paving
3. 32 13 13: Site Concrete

B. Warranty

Note to Design Professional: Review existing or new sub-surface and drainage meet manufacturer's requirements. Require manufacturer's warranties.

Part 2 – Products

A. Manufacturer

1. SofSURFACES https://www.sofsurfaces.com/durasafe
2. Or Approved Equal

B. Rubber Tile

1. Basis of Design: DuraSAFE Rubber Playground Tiles, Plus Series or approved equal:
    a. Recycled rubber material, adhesive application, interlocking, 24" x 24" tiles
    b. Thickness must be a minimum of 3 ½" however thickness will vary as determined by fall height

Note to Design Professional: Colors to be selected from the manufacturer's standard colors. Consider standard colors as well as those within the standard color offerings that may offer more solar reflectance.

Part 3 – Execution

A. Clean and prepare surface per manufacturer requirements.

B. Confirm drainage

C. Submit minimum warranty of 100% non-prorated for the first 6 years from date of shipment

32 30 00 SITE FURNISHINGS

Part 1 – General

A. Related Sections

1. 03 33 00: Cast in Place Concrete
2. 32 12 16: Asphalt Paving
3. 32 13 13: Site Concrete

B. Submittals

1. Provide shop drawings showing dimensioned fall zones and protective surface thickness.

C. Warranty

Note to Design Professional: Require manufacturer's warranties.

Part 2 – Products

A. Bike Racks

1. Manufacturer
    a. LA Steelcraft http://www.lasteelcraft.com/
    b. Or Approved Equal
2. Model BAX-8 - single loaded and BA-15 double loaded.
2. Holders to be ½ inch diameter bar.
3. Runners to be 1 ½ inch x 1 ½ inch x 3/16 inch angle.
4. Hot dipped galvanized after fabrication.

B. Outdoor Tables

1. Manufacturer

a. Webcoat, Inc. http://www.webcoat.com/

b. Or Approved Equal

2. Webcoat Regal style table portable design, Model T8RC.
3. 8 foot long expanded metal table top with two attached 96 inch x 10-1/2 inch seats.
4. ¾ inch #9 poly coated expanded metal top and benches coated with a 1/8 inch to 1/4 inch thick plastisol ultraviolet stabilized vinyl coating fused and baked to a 90 percent gloss.
5. 2 inch x 2 inch angle iron frame with 1 ½ inch x ¼ inch flat stock reinforcement.
6. All rounded corners.
7. Frames to be constructed of all galvanized materials powder coated silver in color.

C. Outdoor Trash and Recycle Receptacles

1. Manufacturer

a. Webcoat, Inc. http://www.webcoat.com/

b. Or Approved Equal

2. Webcoat 32 gallon expanded metal trash receptacle Model TR-32 coated with a 1/8 inch to ¼ inch thick plastisol ultraviolet stabilized vinyl coating fused and baked to a 90 percent gloss.
3. Provide with rigid plastic liner, flat top and anchor kit.
4. Recycle receptacle to include identification symbol.

Part 3 – Execution

Note to Design Professional: Specify wedge anchors for securing bike racks, outdoor tables, trash, and recycle receptacles.

32 31 13 CHAIN LINK FENCES AND GATES

Part 1 – General

A. Related Sections

1. 03 33 00: Cast in Place Concrete
2. 08 71 00: Door Hardware
3. 32 12 16: Asphalt Paving
4. 32 13 13: Site Concrete
5. 32 90 00: Planting

B. Reference Standards

1. Light industrial fencing per CLFMI http://associationsites.com/page.cfm?pageid=903&usr=clfma

Part 2 – Products

A. Galvanized Chain Link Fences

1. Mesh
    a. Galvanized, 2 inch mesh, 9 gage wire.
    b. Fabric Selvage: Knuckled and bent (K&K), top and bottom.
2. Top and Bottom Bar: None, tension wire only.
3. Posts, stretcher bars, braces per Chain Link Fence Manufacturers Institute (CLFMI).

B. Polyvinyl Chloride (PVC) Bonded Fences (site perimeter)

1. Provide all materials and finishes conforming to ASTM specifications and standards.
2. Materials and finishes shall also confirm to Standard Specification for Public Works Construction, Section 206-6.3.2 Polyvinyl Chloride Coated Fabric.
3. Mesh
    a. Galvanized, 2 inch mesh, 9 gage wire.
    b. Fabric Selvage: Knuckled and bent (K&K), top and bottom, coated before weaving.
    c. Coat finish shall be applied prior to weaving and knuckle.
4. Top and Bottom Rail: Provide a top rail and bottom tension wire only.
5. Finish:
    a. PVC coated chain link fabric shall be coated before weaving.
    b. PVC coat shall conform to ASTM F 668.
    c. Class 2b coating consists of polymer coating fused and adhered to zinc-coated steel wire. Specified diameters refer to metallic cores prior to PVC coating. Refer to CLFMI Product Manual and Guide for required thickness of PVC coatings.
    d. Color: Black

C. Swing Gates

Note to Design Professional: Mesh not allowed where panic hardware is required, specify galvanized perforated panel.

1. Frame: 1.666 inch outside diameter, six feet and under. 1.9 inch outside diameter, over six feet.
2. Mesh to match fence.

3. Hardware:

   Note to Design Professional: Specify panic hardware where required (specified in finish hardware section) with custom mounting and strike to be detailed on drawings where required for access or exiting.

   a. Eye and hasp for District furnished padlocks. Eye and hasps to be welded to gate.

   b. Hinges stops and keepers, galvanized, sized to gate. Hinges to be welded to post and gate.

D. Sliding Gates

1. Rolling with two guiderails on fence (or wall) and single wheel at lock end.
2. Steel angle track with welded stop at fully open position.
   a. Eye and hasp for District furnished padlocks. Eye and hasps to be welded to gate.

E. Athletic Field Netting

1. Black rayon mesh, 2 inches square.

Part 3 – Execution

Note to Design Professional: Specify posts at 10 feet on center maximum.

A. At grades of less than 1:12, keep fence level between posts and step posts.

B. Adjust grade to allow no more than 2 inches between fabric and grade.

C. At grades over 1:12, run fabric parallel to grade with no more than one inch space between bottom of fence and grade.

D. Provide braces at end posts and gate posts.

32 31 13.33 CHAIN LINK BACKSTOPS

Part 1 – General

A. Related Sections

1. 03 33 00: Cast in Place Concrete
2. 32 12 16: Asphalt Paving
3. 32 13 13: Site Concrete
4. 32 90 00: Planting

B. Reference Standards

1. Light industrial fencing per CLFMI
   http://associationsites.com/page.cfm?pageid=903&usr=clfma

Part 2 – Products

A. Mesh

1. Galvanized, 2 inch mesh, 9 gage wire.
2. Fabric Selvage: Knuckled and bent (K&K), top and bottom.

B. Top, Middle, and Bottom Bars required.

C. Posts, stretcher bars, braces per Chain Link Fence Manufacturers Institute (CLFMI).

D. Swing Gates:

Note to Design Professional: Pedestrian gates to be maximum 8-foot high, with transoms at taller fences.

1. Frame: 1.666 inch outside diameter, six feet and under. 1.9 inch outside diameter, over six feet.
2. Mesh to match fence.
3. Hardware:
   a. Eye and hasp for District furnished padlocks. Eye and hasps to be welded to gate.
   b. Hinges stops and keepers, galvanized, sized to gate. Hinges to be welded to post and gate.

Part 3 – Execution

Note to Design Professional: Specify posts at 10 feet on center maximum.

A. Install posts 10 feet on center maximum.

B. Adjust grade to allow no more than 2 inches between fabric and grade.

C. Provide braces at end posts and gate posts.

32 84 00 IRRIGATION SYSTEMS

Note to Design Professional: Water usage to be coordinated with CHPS scorecard points.

Part 1 – General

A. Related Sections

1. 32 90 00: Planting
2. 32 92 00: Turfs and Grasses

B. Reference Standards

1. Comply with AB 1881 requirements in particular the location of sprinklers, coverage and water usage.

C. Submittals

Note to Design Professional: Require contractor to provide shop drawings with wiring diagrams.

D. Closeout Submittals

1. Record Drawings: Dimensioned drawings showing system piping, valve locations, watering schedule, irrigation controller schedule and locations of quick couplers and main shut off valve.

E. Warranty

Note to Design Professional: Require manufacturer's warranties.

Part 2 – Products

A. Controller:

1. Manufacturer
    a. ETwater http://etwater.com/
    b. Or Approved Equal
2. ETwater Model 205W Controller Assembly UL listed, pre-installed controller, 120VAC receptacles, terminal boards for wiring, and concealed wiring harness. Specify with the following:
    a. Strong Box - Stainless steel pedestal with top entry enclosure:
        i. ICA6 or 7 depending on size required
    b. ETwater Manager Service Plan – 5-year: The Controller Assembly shall be provided with a 5-year Wireless Data Service Plan for the purpose of allowing web access to the ETwater Manager Server and two-way communication between the service and the controller.
        i. ETW-MGR-5C in addition to the standard, included first year of service
    c. ETwater Flow Monitoring and Control Service Plan - 5-year: The Controller Assembly shall be provided with a 5-year Wireless Data Service Plan for the purpose of allowing web access to the ETwater Manager Server to monitor and control flow on a station be station basis, with web interface, automatic station or master valve shut-down for major leaks and alert notification for out-of-limit flow.
        i. ETW-F5 in addition to the standard, included first year of service

B. Flow Sensor: ETwater Model IFS200, or approved equal

C. Flow Sensing Cable: Paige - P7162D, or approved equal

D. Irrigation Wire: Paige - P7079D, or approved equal

E. Master Valve: Superior Model 3200 or approved equal – coordinate valve size accordingly

F. Battery Controllers: Hunter Model NOD or approved equal

G. DC Solenoid: Rainbird Model TBOSPSOL, or approved equal

H. Solenoid Adapters: Rainbird Model TBOSADAPB, or approved equal

I. Gate Valve: NIBCO Model T113 or approved equal – coordinate valve size accordingly

J. Remote Control Valve: Superior Model 950-DW or approved equal – coordinate valve size accordingly

Note to Design Professional: Do not specify pressure regulation with the remote-control valve.

K. Ball Valves: NIBCO Model T-580 or approved equal – coordinate valve size accordingly

L. Pop-up Gear Driven Rotor: Hunter Model I20-04-SS, or approved equal

M. 6-inch Pop-up Spray Heads: Rainbird Model 1806, or approved equal

N. Rotary Spray Nozzles: Rainbird or Hunter, models must qualify for SoCal WaterSmart Commercial Program Rebates, refer to SoCal WaterSmart for qualifying products list at www.socalwatersmart.com.

O. Valve Boxes: NDS Model 312 BCB (round) or 314 BCB (rectangular) or approved equal. All lids to be heavy traffic rated.

P. Valve Box Lids: Oldcastle Fibrelyte FL12 or approved equal.

Q. Valve ID Tags: Christy, or approved equal

R. Irrigation Piping:

1. All piping to be PVC Schedule 40
2. PVC fittings to be schedule 80: Spears or approved equal
3. PVC Mainline Solvent: Weld-on - 2711 - Heavy
4. PVC Lateral Line Solvent: Weld-on - 2721 - Medium
5. PVC Primer - Weld-on - P-70

S. Performance Requirements

1. Minimum Working Pressures:
   a. Irrigation Main Piping: 200 psi.
   b. Circuit Piping: 150 psi.

Part 3 – Execution

A. Irrigation piping must be pressure tested in the presence of the Project Inspector prior to backfilling. Notify District irrigation representative of pressure testing and prior to backfilling.

B. No underground control wiring splices are permitted.

C. Irrigation lines and control wiring must be sleeved in schedule 40 PVC under walkways.

D. PVC joints to be fully primed prior to applying solvent.

E. Do locate any valves in play areas or pavement.

32 90 00 PLANTING

Part 1 – General

A. Related Sections
   1. 32 84 00: Irrigation Systems
   2. 32 92 00: Turfs and Grasses

B. Quality Assurance
   1. Installer's Personnel Certifications: Certified Landscape Technician, CLT-Exterior.
   2. Soil analysis of each unamended soil type.

C. Maintenance Service
   1. Trees and Shrubs: 12 months.
   2. Ground Cover and Other Plants: six months.

Part 2 – Products

A. Plants, General: Nursery-grown and complying with ANSI Z60.1.

B. Planting Soils: Amended with inorganic and organic soil amendments and fertilizers in specified quantities.

C. Mulches: Shredded Wood Mulch, four-inch thick layers. Testing and District approval required prior to import.

D. Weed-Control Barriers: Composite fabric.

E. Pesticides: Registered and approved by EPA pre-emergent herbicide. District approval also required. Must follow District's IPM Plan, and/or IPM Policy and Healthy Schools Act (HSA) regulations.

F. Tree Grates and Frames: Cast iron grates with cast iron frames.

G. Root barriers: plastic.

H. Planter drainage: Gravel and filter fabric.

Part 3 – Execution

A. Mechanized tree spade planting of designated trees.

B. Ground Cover and Plant Planting: Space ground cover and plants other than trees, shrubs, and vines twelve inches per plan, apart in even rows with triangular spacing.

C. Planting required 90 days, minimum, prior to occupancy.

32 92 00 TURF AND GRASSES

Part 1 – General

A. Quality Assurance

1. Installer's Personnel Certifications: Certified Landscape Technician, CLT-Exterior
2. Provide soils analysis of each soil type.

B. Maintenance Service: Provide 180 days maintenance period from date of planting completion.

Part 2 – Products

A. Turf

1. Common/Moderate use areas: All-Season Sports Field Mix
2. Athletic/Ball field high use areas: All-Season Sports Field Mix
3. Seed: Sports Field Elite mix, by Stover Seed Company, or approved equal

B. Planting Soils: ASTM D 5268 topsoil or existing, native surface topsoil amended with inorganic and organic soil amendments and fertilizers in specified quantities.

1. The maximum allowable gravel or soil particle size is 1/8 inch diameter.

C. Pesticides complying with EPA safety standards for school age children. Must follow IPM, Healthy Schools Act regulations, and be on the District's approved chemical list.

Part 3 – Execution

A. Prior to planting, provide weed abatement process as follows:

1. Obtain Landscape Architect's approval of irrigation system.
2. Must obtain District approval and follow District's IPM policy on notification and record-keeping to ensure Long Beach Unified School District's polices are followed. These policies are in line with the the Healthy Schools Act.
3. Irrigate to geminate weeds for 30 days.
4. Spray weeds with District approved herbicide.
5. Remove weeds.
6. Repeat cycle for 30-days.
7. Obtain Landscape Architect's approval of weed abatement prior to planting..

B. All turf areas are to be hydroseeded and planted at least 90 days prior to occupancy to be established enough for use at time of occupancy.

C. Planting Soil Depth for Newly Graded Subgrades: 8 inches.

D. Surface Soil Enrichment Depth for Unchanged Subgrades: 6 inches.

32 96 00 TRANSPLANTING

Part 1 – General

A. Transplanting trees, including palms, and digging and boxing.

B. Related Sections

1. 32 84 00: Irrigation Systems
2. 32 90 00: Planting
3. 32 92 00: Turfs and Grasses

C. Quality Assurance

1. Tree-Service Firm Qualifications: Qualified landscaping contractor or tree-moving firm with Certified Arborist as certified by ISA.
2. Tree-transplanting program to be prepared by arborist.

D. Seasonal Restrictions: Transplant during in-season periods.

E. Maintenance Service: Twelve months from date of transplanting completion.

Part 2 – Products

A. Backfill Soil: Excavated soil mixed with amendments per soils report.

B. Tree Stabilization: Site-fabricated staking-and-guying method.

C. Watering Devices: Slow-release watering device.

D. Obtain District approval prior to using any pesticides. If needed, pesticides: Use District approved EPA approved pre-emergent herbicide(s), following IPM and Healthy Schools Act (HSA). For additional information: https://www.lbschools.net/departments/business-and-finance/operations/pest-management

E. Planting tablets.

F. Weed-Control Barriers: Composite fabric.

Part 3 – Execution

A. Preparatory Pruning: Root pruning and crown pruning as directed by arborist.

B. Mulching: Mulch ring of four inch thickness extending twelve inches beyond edge of individual planting pit and over whole surface of planting area.

C. Tree Replacement: Replace trees that are twenty-five percent dead, unhealthy, or damaged.

1. Small Trees: New trees of same size as those being replaced that measure four inches or smaller in caliper size.
2. Large Trees: One tree of six inch caliper size for each tree being replaced that measures more than six inches in caliper size.

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DIVISION 33 – UTILITIES

33 11 00 SITE WATER DISTRIBUTION UTILITIES

Part 1 – General

A. Related Sections

1. 31 23 00: Excavation and Fill
2. 32 12 16: Asphalt Paving

B. Reference Standards

1. Conform to Section 207 of the Standard Specifications for Public Works Construction.

Part 2 – Products

A. Water Pipe

1. Copper pipe shall be type L or K.
2. PVC pipe shall conform to AWWA C900.

B. Ductile Iron Pipe (DIP) shall conform to AWWA C104.

C. Gate Valves for PVC and DIP pipe

1. Non-rising stems with double disc gates and mechanical joint ends conforming to AWWA C500
2. Valves shall have 2-inch operating nut when installed in below ground valve boxes
3. Below ground valve boxes shall be in Eisel Enterprises Precast Concrete Products 3L Series or equal.

D. PVC and DIP Joints

1. Pipe joints shall be push on type joints.
2. Gaskets for push on joints shall conform to ASTM F 477.
3. Joints between pipe and metal fittings, valves and other accessories shall be mechanical joints as specified in AWWA C111.
4. Joints for angle points of pipe shall be DIP mechanical joints with restraint glands and concrete thrust blocks per water agency standards. Use of PVC joints will not be allowed.

E. Fire Hydrants

1. Hydrants shall be wet barrel type conforming to AWWA C503
2. Hydrants shall be Mueller A-480 E, LB Ironworks #702, James Jones #J3700 Fluted Barrel, or Clow #550.

F. Mechanical Thrust Restraint

1. Restraint shall be incorporated into the follower gland.
2. Gland shall be ductile iron conforming to ASTM A 536.
3. Restraining device shall be provided with pressure rating equal to that of the pipe on which it is installed.
4. Mechanical thrust restraint devices shall be EBAA Iron Megalug, or Approved equal.

G. Tracer Wire

1. Tracer wire for nonmetallic pipe shall be electrically continuous #14 copper or aluminum tracer wire, Type TW blue plastic covered for domestic water and red for fire sprinkler.

H. Water Service Line Materials

1. Copper tubing shall be Type L and conform to ASTM B 88.
2. Fittings for solder type joints shall conform to ANSI B16.18. Fittings for compression type joints shall conform to ASME B16.26 flared tube type.
3. Corporation stops shall be ground key type manufactured of bronze conforming to ASTM B61.
4. Goosenecks shall be type K Copper tubing.
5. Gate valves 3-inches and smaller shall be MSS SP-80, Class 150 solid wedge and non-rising. Valves shall be provided with flange end connections or threaded end connections with union on one side of valve. Provide direct burial handles for underground valves, do not use spline stems.

I. Water Meter

1. Water meter indicted on Drawings will be installed by water purveyor for the area unless noted otherwise.
2. Provide a second meter for irrigation water.

J. Back flow Preventer Assemblies

1. Assembly shall be provided with flanged connections, galvanized cast iron or epoxy coated construction
2. Double detector backflow preventer assembly shall consist of two independently acting spring loaded toggle lever check valves, 2 shut off valves and 4 test cocks.
3. Backflow assembly shall meet AWWA Standard C510.
4. Backflow preventer devices shall be tested and certified by the water agency having jurisdiction.

K. Bedding and Backfill

Note to Design Professional: Native soil is the District preferred backfill to avoid materials export.

Part 3 – Execution

A. Pipe Installation

1. Install pipe in conformance with Section 306 of the Standard specifications for Public Works Construction
2. Before trench excavation, verify point of connection, pipe depth, invert elevation, and material.
3. Install bell and spigot pipe with bell end pointing in the direction of flow.
4. Provide tracer wire for non-metallic pipes. Fasten to top of pipe at 20-foot intervals.

B. Fire Hydrant Installation

1. Install hydrants according to the requirements of AWWA C600 for hydrant installation
2. Install hydrant with 6-inch RW gate valve at least 4-feet and no more than 10-feet from hydrant
3. Provide metal guard posts in areas of vehicle traffic and not protected by raised curbing.

C. Clearances

1. Water pipe shall be placed a minimum of 5-feet from building walls.
2. Water line shall be separated from the sewer line in accordance with the requirements of the State of California Department of Health Services.
3. Water line shall be installed 1-foot minimum above sewer line crossings.

D. Testing

1. Pressure test pipelines per Local Agency standards and AWWA C600. No leakage is permitted.

E. Disinfection of Domestic Water Line

1. When piping has been installed and tested, sterilize system before use and substantial completion in accordance with Local Agency Standards.

33 30 00 SITE SANITARY SEWER SYSTEMS

Part 1 – General

A. Related Sections

1. 31 23 00: Excavation and Fill
2. 32 12 16: Asphalt Paving

B. Reference Standards

1. Conform to Section 207 and 208 of the Standard Specifications for Public Works Construction

2. Conform to NCPI Requirements
3. Conform to State of California Department of Health Services.

Part 2 – Products

A. Sewer Pipe: PVC pipe shall conform to SDR 35 or schedule 40.

B. Concrete: conform to Section 201 of the Standard Specifications for Public Works Construction

C. Metal Grates, Covers Frames and Accessories: traffic rated (H-20 loading).

D. Bedding and Backfill

1. Pipe shall be installed on a minimum 6-inch sand bedding, above and below pipe, and backfilled.

   Note to Design Professional: Slurry backfill within public roadway sections will be specified as necessary. Native soil is the District preferred backfill to avoid materials export.

E. Manhole Mortar and Grout: Install without steps.

F. Clean-out Assemblies

1. Clean-out assemblies shall be embossed with "SEWER" on cover.
2. Cleanout assemblies shall be Eisel Enterprises Precast Concrete Products 3L Series with cast iron locking cover.

Part 3 – Execution

A. Installation

1. Jetting of backfill will not be allowed for consolidation of trench. Water shall be added to assist with trench compaction to obtain 90 percent relative compaction.
2. Before trench excavation, verify point of connection, depth, invert elevation, and material.
3. Construct pipe slope at 2 percent minimum unless invert elevations are indicated.
4. Install cleanout assemblies at 100-foot minimum spacing and at angle points.

B. Clearances

1. Sewer pipe shall be placed a minimum of 5-feet from building walls.
2. Sewer pipe shall not be placed in same trench as water line.
3. Project site sanitary sewer receiving more than one building sanitary sewer shall be separated from the water line in accordance with the requirements of the State of California Department of Health Services.
4. Sewer shall be installed 1-foot minimum below water line crossings.

C. Testing

1. After installation, test pipeline between successive manholes for infiltration or exfiltration in accordance with Section 306- of the Standard Specifications for Public Works Construction.

33 40 00 STORM DRAINAGE SYSTEMS

Part 1 – General

A. Related Sections

1. 31 23 00 Excavation and Fill
2. 32 12 16 Asphalt Paving

B. Reference Standards

1. Conform to Section 207 Pipe and 208 Pipe Joint Types and Materials, of the Standard Specifications for Public Works Construction.
2. Concrete materials shall conform to Section 201 of the Standard Specifications for Public Works Construction.
3. Metal grates, cover frames, and accessories shall conform to Section 206 of the Standard Specifications for Public Works Construction.

Part 2 – Products

A. Storm Drain Pipe

1. PVC pipe shall conform to SDR 35 or schedule 40.
2. HDPE pipe shall conform to AWWA C901 or C906.

B. Metal Grates, Cover Frames and Accessories

1. Exposed metal items shall be galvanized
2. Covers and Grates shall be traffic rated (H-20 loading).
3. Grates and Frames shall be ADA accessible and provided with lockable features to secure from vandalism.

C. Bedding and Backfill

1. Pipe shall be installed on a minimum 6-inch sand bedding, above and below pipe, and backfilled.

   Note to Design Professional: Slurry backfill within public roadway sections will be specified as necessary. Native soil is the District preferred backfill to avoid materials export.

D. Catch Basins and Drainage Inlets

1. Prefabricated drainage inlets shall be installed on 6-inches aggregate base.

2. Use of plastic grates will not be allowed.

Part 3 – Execution

A. Installation

1. Jetting of backfill will not be allowed for consolidation of trench. Water shall be added to assist with trench compaction to obtain 90 percent relative compaction.

B. Testing

1. Drainage pipes and inlets shall be flow tested prior to acceptance

a. Flood testing, including landscaped areas, required in presence of inspector to confirm drainage.

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PART 3 – APPENDICES

APPENDIX A – MASTER SPECIFICATIONS

Word versions of the following master specifications are available on the Facilities Design Standards Website or from the District. For Division 1 documents, please contact your assigned District Representative

01 11 00 SUMMARY OF WORK

01 12 10 PHASING OF WORK CONTRACT FORMS AND SUBMITTALS

01 20 00 PRICE AND PAYMENT PROCEDURES

01 21 00 ALLOWANCES

01 23 00 ALTERNATES AND UNIT PRICING

01 25 10 PRODUCT OPTIONS AND SUBSTITUTIONS

01 26 00 CONTRACT MODIFICATION PROCEDURES

01 26 10 REQUEST FOR INFORMATION

01 31 10 COORDINATION AND PROJECT MEETINGS

01 32 16 CONSTRUCTION SCHEDULE – NETWORK ANALYSIS

01 33 00 SUBMITTALS

01 35 45 COLLABORATIVE FOR HIGH PERMANCE SCHOOLS (CHPS) SPECIAL ENVIRONMENTAL REQUIREMENTS

01 35 91 PRESERVATION, RESTORATION, AND CONSERVATION FOR HISTORICAL BUILDINGS

01 40 00 QUALITY REQUIREMENTS

01 42 13 ABBREVIATIONS AND ACRONYMS

01 42 16 GENERAL DEFINITIONS AND REFERENCES

01 45 24 ENVIRONMENTAL IMPORT MATERIALS TESTING

01 45 25 ENVIRONMENTAL EXPORT MATERIALS TESTING

01 45 29 TESTING LABORATORY SERVICES

01 50 00 TEMPORARY FACILITIES AND CONTROLS

01 52 10 SITE STANDARDS

01 56 39 TEMPORARY TREE AND PLANT PROTECTION

01 57 10 STORM WATER POLLUTION PREVENTION PLAN (SWPPP – CONSTRUCTION POLLUTION PREVENTION PLAN)

01 60 00 MATERIALS AND EQUIPMENT
01 66 10 DELIVERY, STORAGE, AND HANDLING
01 73 00 EXECUTION
01 73 10 CUTTING AND PATCHING
01 77 00 CONTRACT CLOSEOUT AND FINAL CLEANING
01 78 23 OPERATION AND MAINTENANCE DATA
01 78 36 WARRANTIES
01 78 39 RECORD DOCUMENTS
01 91 00 COMMISSIONING
02 41 13 SELECTIVE SITE DEMOLITION
02 41 19 SELECTIVE DEMOLITION
02 82 13 ASBESTOS ABATEMENT AND ASBESTOS RELATED DISTURBANCE
02 83 33 LEAD ABATEMENT AND LEAD RELATED DISTURBANCE
07 52 16 SBS MODIFIED BITUMINOUS MEMBRANE ROOFING (OFCI)
08 71 00 DOOR HARDWARE
11 40 00 FOOD SERVICE EQUIPMENT
11 51 19 BOOK THEFT PROTECTION SYSTEM
23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC
27 10 00 STRUCTURED CABLING FOR NEW SYSTEM
27 10 00 STRUCTURED CABLING FOR EXISTING SYSTEM
27 20 00 DATA COMMUNICATIONS ACTIVE INFRASTRUCTURE
27 30 00 VOICE COMMUNICATIONS FOR EXISTING SYSTEM
27 30 00 VOICE COMMUNICATIONS FOR NEW SYSTEM
27 41 16 AUDIOVISUAL SYSTEMS
27 41 33 MASTER ANTENNA AND TELEVISION SYSTEM
27 50 00 DIGITAL INTERCOM CLOCK AND BELL SYSTEM
27 51 26 ASSISTIVE LISTENING SYSTEM
28 13 53 VIDEO INTERCOM SYSTEM
28 16 00 INTRUSION DETECTION FOR NEW SYSTEM
28 16 00 INTRUSION DETECTION FOR EXISTING SYSTEM
28 23 00 DIGITAL VIDEO SURVEILLANCE
28 31 11 DIGITAL ADDRESSABLE FIRE ALARM

31 13 24 SYNTHETIC BASE UNDERLAYMENT MATERIAL

32 18 14 IN-FILLED SYNTHETIC TURF

APPENDIX B – Not Used

APPENDIX C – SINGLE SOURCE BOARD RESOLUTIONS

A. LBUSD has identified the following items that the District would like to single source:

1. Single Source Board Resolution Number 041712-B (Board Approved April 17, 2012, available on the Facilities Design Standards website) includes:

    a. Digital Intercom / Clock and Bell Systems

    b. Classroom Audio Visual System

    c. Intrusion Detection System

    d. Telephone System

    e. Fire Alarm Systems

2. Single Source Board Resolution Number 061813-G (Board Approved June 18, 2013, available on the Facilities Design Standards website) includes:

    a. Wireless Infrastructure System

    b. Security Surveillance Camera and Management System

    c. Library Book Detection System

3. Single Source Board Resolution 100423-A (Board Approved October 4, 2023, available on the Facilities Design Standards website) includes:

    a. Electronic Door Locks /Access Control