INGLEWOOD UNIFIED SCHOOL DISTRICT

July 10, 2025

RE: Addendum #2
BID #25.108 Site Improvements at Bennett Kew

To All Bidders,

The submission deadline for the BID has been changed to July 23, 2025 by 2 PM via PQ BIDs. The change will be made to the PQ BIDS posting by the end of the business day.

Further clarification was requested for the following questions:

1. Question: The BID documents mentions that DVBE is required, but it also states to check the Special Conditions to see if it applies to the project. Can you please confirm if DVBE participation is required for this project?
   Answer: Good faith effort must be made, but it's not a requirement.
2. Question: Please advise on when the project plans will be posted?
   Answer: See Addendum #1.
3. Question: There are no division 22 specifications provided as noted on the table of contents.
   Answer: See attached.
4. Question: Please provide finish schedule. Sheet A-141 does not provide material selections.
   Answer: See attached.
5. Question: Please provide specifications for tackboards and markerboards shown in elevations
   Answer: See attached.
6. Question: The playground renderings on A-901 show an integrated shade structure. The top view of the equipment does not show that integrated shade. Please confirm if the playground equipment will have integrated shade?
   Answer: See attached.
7. Question: Is the contractor responsible to provide an install window treatments? There are none noted in the bid documents.
   Answer: See attached.
8. Question: What are the color blends for the PIP Rubber Safety Surfacing? Examples: 50% Std. EPDM & 50% Black / 100% Std. EPDM - no black / Premium Colors/Other

Please confirm which Urethane is required for the Wear Course: Aromatic or Aliphatic? Aliphatic is a UV Stable Urethane and will not Amber during the high UV Ray Seasons - $3.25 per SF more than Aromatic. Please confirm the Fall Heights for each play component and if the safety surfacing can vary in thickness based on different fall heights in different use zones?
Answer: See attached.

9. Question: Please clarify acoustical ceiling material to be used, as specs do not match RCP sheet A-12
   Answer: See attached.
10. Question: Detail A/L-304 shows wall-mount controller. However, irrigation material legend/L-302 shows a pedestal mounted controller. Please clarify.
    Answer: See attached.
11. Question: There is no model such Strong box BS-16SS enclosure as shown on Irrigation material legend/L-302. Please clarify.
    Answer: See attached.
12. Question: Irrigation material legend/L-302 shows point of connection at existing 3" mainline. However, callout on plan L-301 shows a point of connection at the existing 2.5" domestic mainline. Please clarify.
    Answer: See attached.
13. Question: Irrigation material legend/L-302 shows sleeves shall be pvc sch. 40. However, specification 328400/3.02 shows pvc sch. 80. Please clarify.
    Answer: See attached.
14. Question: Specification 3.08/ 329300 shows trees are planted within 5' of paving with a total distance of 10' per tree. However, detail C/L-402 shows trees planted within 6' of hardscape improvements with minimum 16' length. Please clarify.
    Answer: See attached.
15. Question: Irrigation material legend/L-302 shows to use remote control valves for the bubbler heads system. However, irrigation plan L-301 shows symbols of drip remote control valves serving the bubbler tree system. Please clarify.
    Answer: See attached.
16. Question: Please provide the ratios of soil preparation amendment for bidding purposes.
    Answer: See attached.
17. Question: Please provide the ratios of backfill mix at planting root ball for bidding purpose.
    Answer: See attached.

INGLEWOOD UNIFIED SCHOOL DISTRICT

Sincerely,

Christopher Diaz

Christopher Diaz
Director of Purchasing

HED

Request for Information Response

Bid RFI Number **1-15**

Client Name	AESD	Project Number	2023-IU002-002
Project Name	Bennett-Kew P-8 Academy	Date Issued	7/9/2025
Responded By	W. McCarthy	Subject	Bid RFIs

This response does not authorize extra work or schedule changes, nor does it relieve the contractor of responsibility for full compliance with the contract documents. The Architect / Engineer's review is for general conformance with the design concept and the Contract Documents. If the contractor feels the interpretation of the RFI generates a change to the Agreement, notification must be made to the Owner's Representative within three (3) days of receipt of the RFI response.

Question	See Bid RFI questions 1 – 15
Response	See comments below.
Category	Bid RFI
Justification	Click or tap here to enter text.

1. Question: There are no division 22 specifications provided as noted on the table of contents.

Answer: See attached Specifications sections 22-1000, 22-0513, 22-0553, 22-0700, 22-0500.

2. Question: Please provide finish schedule. Sheet A-141 does not provide material selections.

Answer:
VCT-1: UPOFLOOR Quartz Tile #8357
VCT-2: UPOFLOOR Quartz Tile #8356
VM: Portal Tile ST035 Color Lava
T-1: Daltile Color Wheel Rectangular – Arctic White 0190
T-2: Daltile Color Wheel Rectangular – Sea Breeze 1174
T-3: Daltile Color Wheel Rectangular – Dessert Grey X114
Conc: Cement TC-27 / Top Coat EC-11
Countertops: Cambria Snowdon White Classic Collection
Paint 1: P1 Dunn Edwards DEW 380 White (flat for ceilings)
Paint 2: P2 Dunn Edwards DEW 380 White (Semi-Gloss for walls and restroom ceilings)
Rubber Base: B1 Tarkett / Johnsonite 4" High Color TBD
Rubber Base: B2 Tarkett / Johnsonite 4" High Color TBD

3. Question: Please provide specifications for tackboards and markerboards shown in elevations

Answer: See attached spec 10-1100 for Marker Boards. Tackable surfaces – Forbo Bulletin Board Color 2182 &2185

4. Question: The playground renderings on A-901 show an integrated shade structure. The top view of the equipment does not show that integrated shade. Please confirm if the playground equipment will have integrated shade?

Answer: Confirmed the Play structure shall have an integrated shade.

5. Question: Is the contractor responsible for providing and installing window treatments? There are none noted in the bid documents.

Answer: See attached specification. Provide accessible manual roller shades at each window. Roller Shades: Materials specified in this Section are based on "District with Newton High-Speed Lite-Lift technology, Two-Wand Operated" as supplied by Altex Inc

6. Question: What are the color blends for the PIP Rubber Safety Surfacing? Examples: 50% Std. EPDM & 50% Black / 100% Std. EPDM - no black / Premium Colors/Other

Please confirm which Urethane is required for the Wear Course: Aromatic or Aliphatic? Aliphatic is a UV Stable Urethane and will not Amber during the high UV Ray Seasons - $3.25 per SF more than Aromatic. Please confirm the Fall Heights for each play component and if the safety surfacing can vary in thickness based on different fall heights in different use zones?

Answer: Playground Surface (Complex 23-39034) Gezolan TPV EPDM 1-4mm 75% Std. Blue RH20 / 25% Pale Gray RH65

7. Question: Please clarify acoustical ceiling material to be used, as specs do not match RCP sheet A-12

Answer: Provide ACT-1: Armstrong – Prelude XL 2x4 Grid
ACT-2: Armstrong - Cirrus, Second Look (6" scored tegular tiles)
ACT-3: Armstrong – Clean Room VL 2x4 Grid
ACT-4: Kanopi by Armstrong – Fire Rated, Fine Fissured 2x4 Grid

8. Question: Detail A/L-304 shows wall-mount controller. However, irrigation material legend/L-302 shows a pedestal mounted controller. Please clarify.

Answer: Per sheet L301, new controller is a Rain Bird ESP-LXME2 **wall mounted** in steel enclosure inside electrical room. (Legend noted mounting is incorrect.) the location of the irrigation controller moved from the outside of the building to inside. The latest irritation shows the controller wall mounted inside the buildings electrical room. This will not require and additional strong box enclosure. irrigation valve/controller wire are to be in PVC Sweep ells.

9. Question: There is no model such Strong box BS-16SS enclosure as shown on Irrigation material legend/L-302. Please clarify.

Answer: Please see answer above #8. No longer needed.

10. Question: Irrigation material legend/L-302 shows point of connection at existing 3" mainline. However, callout on plan L-301 shows a point of connection at the existing 2.5" domestic mainline. Please clarify.

Answer: No, the sleeves are 3" and the mainline is 1-1/4".

11. Question: Irrigation material legend/L-302 shows sleeves shall be pvc sch. 40. However, specification 328400/3.02 shows pvc sch. 80. Please clarify.

Answer: Specifications take precedence

12. Question: Specification 3.08/ 329300 shows trees are planted within 5' of paving with a total distance of 10' per tree. However, detail C/L-402 shows trees planted within 6' of hardscape improvements with minimum 16' length. Please clarify.

Answer: Specifications take precedence, however for bid purposes, follow detail C/L-402

13. Question: Irrigation material legend/L-302 shows to use remote control valves for the bubbler heads system. However, irrigation plan L-301 shows symbols of drip remote control valves serving the bubbler tree system. Please clarify.

Answer: Shrub drip valves = Rain Bird commercial control zone kit.
Tree bubbler valves = Rain Bird PESB domestic water valve.

14. Question: Please provide the ratios of soil preparation amendment for bidding purposes.

Answer: : For bidding, use the following soil preparation amendments rates per 1,000 SF:

- 6" incorporation
- Triple superphosphate (0450) – 4 pounds
- Agricultural gypsum 20 pounds
- Good quality soil amendment ~4 CY for 3- 5% soil organic matter on a dry weight basis)

For the preparation on a volume basis, homogeneously blend the following into clean soil. Rates per cubic yard:

- Triple superphosphate (0450) – 1/4 pound
- Agricultural gypsum – 1 pound

- Good quality soil amendment ~ 20% by volume for 3- 5% soil organic matter on a dry weight basis

After Ammeding:
- Irrigate deeply initially, lower the pH to less than 8.0.
- apply ammonium sulfate (2100) at 5 pounds per 1,000 square feet if nitrogen is low.

For maintenance
- apply ammonium sulfate (2100) at 5 pounds per 1,000 square feet about once per quarter

15. Question: Please provide the ratios of backfill mix at planting root ball for bidding purpose.

Answer: For bidding, use 30% organic matter (compost) mixed with 70% existing soil

2023-IU002-002 IUSD Bennett-Kew P-8 Academy - Bid RFIs
Material Selections

SECTION 10 1100

VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wall mounted marker boards.
2. Horizontal sliding marker boards and map rail at media wall cabinets.
3. Horizontal sliding marker boards and map rail at science classrooms.
4. Tack boards.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 06 1000 - Rough Carpentry.
3. Section 06 4000 - Architectural Woodwork: Media wall cabinets at classrooms.
4. Section 09 9000 - Painting and Coating.

1.02 SUBMITTALS

A. Shop Drawings: Shop Drawings to indicate gages, profiles, sections of materials, details of construction, hardware, methods of attachment and/or anchoring, as applicable for specified materials.

B. Samples: Submit the following:

1. Three- inch by 5-inch marker board Samples, provide manufacturer’s full range of colors.
2. Three- inch by 5-inch sliding tack board Samples, provide manufacturer’s full range of colors and patterns.
3. Three- inch by 5-inch sliding bulletin board Samples, provide manufacturer’s full range of colors.

C. Product Data: Submit manufacturer’s technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified.

1.03 QUALITY ASSURANCE

A. Manufacturer shall have been regularly engaged in the business of manufacturing markerboards for at least five years.

B. Comply with requirements and recommendations of applicable portions of Porcelain Enamel Institute - PEI 2.

1.04 PRODUCT HANDLING

A. Deliver materials to the Project site with manufacturer's labels intact and legible.

B. Protect marker boards before, during and after installation.

1.05 JOB CONDITIONS

A. Sequencing, Scheduling:

1. Coordinate with related Work of other sections including gypsum board and tackboards.

2. Do not install markerboards until paint is installed to surfaces concealed behind them.

1.06 SPECIAL PROJECT WARRANTY

A. Manufacturer shall provide a life of the building warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Marker board

1. W.E. Neal Slate Co.

2. Platinum Visual Systems.

3. Claridge Inc.

4. Nelson Adams NACO

5. Equal.

B. Interactive Projector Board

1. Moore Co.

2. Epson Da-Lite IDEA Screen.

3. Claridge Inc. Aspire.

4. Equal.

2.02 SYSTEM PERFORMANCE

A. System shall be comprised of factory assembled markerboards, in configurations and sizes indicated on the Drawings or as specified herein.

B. Laminations of panel components shall be by face sheet manufacturer.

2.03 MATERIALS

A. Wall-Mounted Marker boards:

1. Dry marker boards shall be porcelain enamel steel manufactured to exceed the performance specifications for porcelain enamel S104 of the Porcelain Institute. Markerboards shall be capable of supporting papers by means of magnets. The writing surface shall resist wear and damage from shock and abrasion and shall not dent, shatter or crack. The surfaces shall retain original color, writing, and erasing qualities and shall not become glossy or shiny in normal use. The gloss variation of a surface shall not exceed three units when measured by a 45 degree gloss meter in accordance with the Porcelain Enamel Institute Bulletin 1-18 Gloss Test for Porcelain Enamels and ASTM C346.

2. Steel: Base metal shall be high quality enameling iron or steel of low metalloid and copper content, especially manufactured and processed for temperatures over 1,400 degrees F. used in coating porcelain on steel units for Architectural purposes; minimum 24 gage.

3. Facing Surfaces: Board surfaces shall consist of the following:

a. Primer coat, 0.0025 inch minimum thickness.

b. Vitreous-porcelain writing surface coating of 0.0025 inch minimum thickness.

c. The reverse side of the steel base sheet shall receive a ground coat of 0.0005 inch thickness and a spray coat of silicon.

d. The panel edges at butt joints shall be porcelain enamel.

e. Fuse cover and ground coats to the steel at the manufacturer’s standard firing temperature, but at least 1,250 degrees F.

4. The dry marker board surfaced steel shall be factory laminated to 7/16 inch thick fiberboard core. A moisture blocking backing sheet shall be provided.

a. Fiberboard Core shall be #45 pound particle board.

b. Moisture Barrier Backer Sheet shall be minimum .015 aluminum or 28 gauge galvanized steel. Backer sheet shall be factory laminated to the core under pressure.

5. Lamination: The surface facing and the backing shall be bonded to the core material by means of a special flexible adhesive developed for this purpose with no unbonded area. The face and back shall not be removable without rupturing the core material. Panels shall not delaminate under normal use.

6. Joints: Where vertical joints occur, a 14 gage continuous concealed steel spline shall be fitted tightly into grooves in the core material. Factory rabbet to produce a smooth butt joint. Do not furnish exposed trim.

7. Edge Trim:

   a. Alloy 6063-T5, extruded, anodized satin finish aluminum.

8. Chalktray: Furnish manufacturer's standard continuous flat-ribbed or box-type aluminum chalktray with stained front and cast plastic end closures for each chalkboard and markerboard. Chalk tray shall not protrude more than four inches from the wall.

   a. Extend chalk tray to end of both vertical edges of the board.

   b. On flat-rib tray, provide 3/4 inch radius on corners and polish at ends.

9. Map Rail: Furnish map rail at the top of each unit, complete with the following accessories:

   a. Display rail: Provide continuous cork display rail 2-inch wide, as indicated, integral with the map rail. Extend display rail to end of both vertical edges.

   b. End stops: Provide one end stop at each end of the map rail.

   c. Map hooks: Provide two map hooks with flexible paper holder clips for each 8 feet of map rail or fraction thereof.

   d. Roller Map Bracket: Provide two for each 8 feet of map rail or fraction thereof.

B. Soffit Mounted Horizontal Sliding Marker boards (at Media Walls).

1. Frame: Heavy-duty aluminum.

   a. Top Supported Trolley System.

   b. Top Track/Carrier: Five adjustable ball bearing carriers per panel. Provide rubber bumpers at ends of track.

   c. Bottom Guide Channel: Manufacturer's standard.

2. Marker board: 24 gage porcelain enamel steel laminated to 7/8 inch thick honeycomb core with moisture barrier backing sheet of 0.015 aluminum and aluminum trim at perimeter and nylon guides at guide channel edge.

a. Marker board facing color: White, unless otherwise indicated on Drawings.

b. Pulls: Provide two recessed pulls per panel at jambs.

3. Map Rail, surface mounted 2-inch width, with insert and end stops, or equal.

a. Combination Maphook/Clip. Provide two for each eight feet of map rail or fraction thereof.

b. Roller Map Bracket. Provide two for each eight feet of map rail or fraction thereof.

4. Chalk Tray: Manufacturer's standard. Chalk tray shall not protrude more than four inches from the cabinetry.

C. Wall Mounted Horizontal Sliding Marker boards – Double Panel (at Science and Laboratory Classrooms):

1. Frame and Track and Chalk tray: Heavy-duty aluminum wall frame fabricated with 3-inch by 1 ½-inch frame channels and interior fitting C-clip wall channels.

a. Top Roller Supported Trolley System and Top Carrier: Guide track with five adjustable ball bearing carriers per panel.

b. Bottom Guide: Inner and Outer Boards with rubber bumpers at ends.

c. Chalk tray shall be attached directly to wall four inches below the bottom of the marker board frame, and shall not protrude more than four inches from the wall.

2. Sliding Marker Board: 24 gage porcelain enamel steel on 7/8 inch thick paper honeycomb with 0.015 aluminum backing and trim at perimeter and nylon guides at guide channel edge.

a. Marker board facing color: White, unless otherwise indicated.

b. Pulls: Provide two per panel at jambs.

3. Fixed (Wall Mounted) Marker Board: 24 gage porcelain enamel steel on either 7/16 inch fiberboard core or 7/8 inch thick paper honeycomb with 0.015 aluminum backing and trim

4. Map Rail, surface mounted 2-inch width, with insert and end stops.

a. Combination Maphook/Clip. Provide two for each eight feet of map rail or fraction thereof.

b. Roller Map Bracket. Provide two for each eight feet of map rail or fraction thereof.

D. Projection boards:

1. White mat or low gloss porcelain finish 5 x 8 feet.

2. White porcelain, minimum 28 gage porcelain enamel steel on either fiberboard core or paper honeycomb with aluminum or galvanized steel backer.

3. Edge Trim: Alloy 6063-T5, extruded, anodized satin finish aluminum.

4. Moisture barrier backing sheet shall be minimum .015 aluminum or galvanized steel.

E. Tack boards:

1. Tackwall panels shall consist of single-face layer of cloth-backed vinyl film, factory-bonded to 1/2 inch wood fiberboard backing; weight of vinyl film to be 20 ounces per lineal yard. Panel edges shall be beveled and wrapped; ends shall be square and unwrapped. Color as selected by ARCHITECT.

a. Vinyl film shall comply with FS CCC-W-408 A, Type 1; backing shall comply with FS LLL-1-535B, Class A. Finished panel shall have a Fire Hazard Classification of Class II in accordance with ASTM E84 tunnel test, as administered by California State Fire Marshal approved testing laboratory.

2. Adhesive shall be as recommended by manufacturer.

F. Flagpole Holder: Provide one per classroom where marker boards are provided.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install markerboard, trim, map rail and marker tray in accordance with manufacturer's directions. Fasteners for assembly of trim and frame units shall be truss head aluminum or stainless steel self-tapping screws with double cadmium-plated finish.

B. Install panels after finish painting of wall surfaces has been completed and paint is cured. Install panels level, plumb and neatly assembled. Before Substantial Completion, trim shall be cleaned of dirt, finger-marks, and other foreign material.

C. Install panel guides, spacers, and panels at media wall cabinets.

3.02 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 12 2413

MANUAL ROLLER WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manual roller shades and accessories.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Concealed wood blocking for attachment of shade brackets and accessories.

B. Manual roller shades shall comply with 11B-309 and shall be operable without grasping, pinching or twisting of the wrist.

1.03 REFERENCE STANDARDS

A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

B. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute; Current Edition.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.

E. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

F. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:

1. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.
2. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product to be used including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

C. Shop Drawings: Include shade schedule indicating size, location and keys to details.

D. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.

E. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.

F. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.

H. Operation and Maintenance Data: List of all components with part numbers, and operation and maintenance instructions; include copy of shop drawings.

I. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of this type with minimum ten years of documented experience with shading systems of similar size, type, and complexity; manufacturer's authorized representative.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 MOCK-UP

A. Mock-Up: Provide full size mock-up of window shade system complete with selected shade fabric including example of seams and batten pockets or as required to simulate jobsite conditions when applicable.
   1. Obtain Architect's approval of light and privacy characteristics of fabric prior to fabrication.
   2. Full-sized mock-up may become part of the final installation if approved.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.09 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's standard, non-depreciating warranty, for interior shading only, covering the following:
   1. Shade Hardware: 10 years unless otherwise indicated.
   2. Shade Fabric: 10 years unless otherwise indicated.

PART 2 PRODUCTS

201 MANUFACTURERS

A. Basis of Design: Altex Inc OR EQUAL

B. Substitutions: See Section 016000 - Product Requirements.

202 ROLLER SHADES

A. General:
   1. Provide shade system components that are capable of being removed or adjusted without removing mounted shade brackets or cassette support channel.
   2. Provide shade system that operates smoothly when shades are raised or lowered.
   3. Provide shade system that is Cradle-to-Cradle certified and listed in C2C (DIR).
   4. Electrical Components: Listed, classified, and labeled as suitable for the purpose intended. Individual testing of components will not be acceptable in lieu of system testing. Where applicable, system components to be FCC compliant.
   5. Shade system must be (CBC/CFC 806.4) Flame resistant in accordance with CCR, Title 19, Division 1 Chapter 8.

B. Basis of Design - Roller Shades: Materials specified in this Section are based on “District with Newton High-Speed Lite-Lift technology, Two-Wand Operated” as supplied by Altex Inc
   1. Description: Double roller, manual operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
      a. Drop Position: Regular roll.
      b. Mounting: As indicated on drawings
      c. Size: As indicated on drawings.
   2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
      a. Double Roller Brackets: Configured for light-filtering and room-darkening shades in one opening.
   3. Roller Tubes:
      a. Material: Extruded aluminum.
      b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
      c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without

removing roller tube from brackets or inserting spline from the side of the roller tube.

4. Hembars: Designed to maintain bottom of shade straight and flat.
   a. Style: Exposed aluminum bottom bar with matching finials, rectangular profile.
   b. Room-Darkening Shades: Provide a slot in bottom bar with wool-pile light seal.
5. Accessories:
   a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; baked enamel finish.
      1) Fascia to be capable of installation across two or more shade bands in one piece.
      2) Color: To be selected by Architect.
      3) Profile: Square.
   b. Room-Darkening Channels, Standard: Extruded aluminum side and center channels with brush pile edge seals, SnapLoc mounting base, and concealed fasteners. Channels to accept one-piece exposed blackout hembar to assure side light control and sill light control.

203 SHADE FABRIC

A. Fabric for Room-Darkening Shades: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
   1. Material Composition:
      a. Fiberglass with acrylic backing.
   2. Material Certificates and Product Disclosures:
      a. Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).
      b. Health Product Declaration (HPD): Complete, published declaration with full disclosure of known hazards.
   3. Color: As selected by Architect from manufacturer’s full range of colors.
   4. Fabrication:
      a. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.
         1) Battens: Manufacturer's standard material, full width of shade, and enclosed in welded shade fabric pocket; locate as indicated on drawings.
         2) Seams for Railroaded Fabric: Manufacturer's standard sewn seam; locate as indicated on drawings.
   5. Products:
      a. MechoShade Systems LLC Inc; EcoVeil Screens - 1550 Series (3% open): www.mechoshade.com/#sle.

204 OPERATING DESIGN CRITERIA

1. Operating Mechanism: Provide a patented Two-wand operated system designed to use shade band inertia to ensure smooth, controlled, and high-speed operation. Single wand systems are not permitted.
2. Operational Force: System must operate with a maximum activation force of 22.5 N (5 lbs), regardless of shade size or shade band type.
3. Minimum travel speed: Shades must operate at a minimum speed of 1.2 m/s (4 ft/s) for raising and lowering.
4. System Design:
    a. Chainless Operation: System design must be free of exposed cords or reachable chains.
    b. Shade Stability: Shades must hold securely at any position without slipping or unintended movement. Hand lowering by pulling on the hembar must not cause damage to the clutch, spring, or other components.
    c. Multidirectional Controls: Controls must permit multidirectional operation with a single hand. Operation must be possible through forward or side reach to accommodate vertical, lateral, or angled operation.
    d. Obstacle Accommodation: System must be designed to function around obstacles, including desks or other furniture.
    e. Independent Operation: System must be designed such that one handed operation does not rely on attachment to walls, mullions, or building elements.
5. Acoustics: Mechanisms must be designed to minimize noise and friction during operation. The system must operate smoothly along its entire operational range without jerking or excessive resistance.
6. Durability: System components must withstand a minimum of 10,000 full operational cycles. A cycle is defined as fully raising and lowering the roller window shade assembly.
7. Emissions: Fabrics must comply with CDPH Standard Method for VOC Emissions (California Specification 01350) for indoor air quality, in accordance with UL 2818 (GREENGUARD Gold), SCS Global Services Indoor Advantage Gold, or other approved third-party certification.
8. Cleanability: Exposed components must have smooth, non-porous surfaces to facilitate cleaning.
9. Removability: Roller tubes must be removable without disassembling the drive mechanism, resetting stops, or readjusting pre-set limits. Mounting must allow easy removal and replacement of roller shades without causing damage to adjacent surfaces or finishes.

205 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
    1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.

2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.

C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.

C. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

C. See Section 017419 - Construction Waste Management and Disposal for additional requirements.

3.05 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.

C. Training: Train Owner's personnel on operation and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of two hours training by manufacturer's authorized personnel at location designated by the Owner.

3.06 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.07 MAINTENANCE

A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

END OF SECTION

SECTION 22 0500

COMMON WORK RESULTS FOR PLUMBING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section provides the basic plumbing requirements that apply to the Work of Division 22.

B. Related Requirements:

1. Division 01: General Requirements.
2. Division 22: Plumbing
3. Division 23: HVAC
4. Division 26: Electrical.

1.02 REGULATORY REQUIREMENTS

A. Current federal Safe Drinking Water Act (SDWA) regulations require the furnishing of lead-free pipe, solder, and flux in the installation or repair of plumbing in non-residential facilities connected to public drinking water systems. Under this regulation, solders and flux are considered lead-free when they contain 0.2 percent lead or less. Under California regulations pipes and pipe fittings are considered lead-free when they contain 0.25 percent lead or less as defined in California Assembly Bill 1953 (AB 1953). No pipe, pipe fittings, or any other fitting or fixture intended to convey or dispense water for human consumption by drinking or cooking is allowed in the domestic plumbing system, if they do not meet the low lead definition of AB 1953. Weighted average lead content of the wetted surface area of pipes, fittings and fixtures may not exceed 0.25 percent.

1. Provide lead-free water pipe, solder, and flux materials that meet the standards as outlined by the federal SDWA regulations and California AB 1953 if installed in drinking water system.
2. Collect pipe, solder, and flux material samples as required by the Project Inspector. Test samples shall be delivered to an Owner designated testing laboratory for testing of lead content.
    a. Test samples for lead content by the atomic absorption spectrophotometry method.
3. Materials found not conforming to SDWA and California AB 1953 regulations shall be deemed defective Work and shall be replaced with lead-free materials.
4. Comprehensive testing of the remaining materials for their lead content shall be performed as required by the Project INSPECTOR.

A. Materials, fabrication, equipment, and installation shall comply with industry standards and code requirements. Where manufacturer's recommendations exceed

industry standards, the manufacturer's recommendation shall establish the minimum standard. As a minimum, standards from the following organizations shall apply:

1. ANSI - American National Standards Institute.
2. ASME - American Society of Mechanical Engineers.
    a. ASME Boiler and Pressure Vessel Code.
    b. ASME B31 - Standards for Pressure Piping.
3. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers.
4. ASTM - American Society for Testing and Materials.
    a. ASTM A53 Specification for Welded and Seamless Pipe.
5. AWWA - American Water Works Association.
6. CSA - Canadian Standards Association.
7. FM Global - Factory Mutual Global
8. IAPMO - International Association of Plumbing and Mechanical Officials.
9. NFPA - National Fire Protection Association.
10. OSHA - Occupational Safety and Health Administration.
11. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association.
12. UL - Underwriters Laboratories Inc.
13. Intertek (ETL Certification).

B. Materials, fabrication, equipment, and installation shall comply with federal, state, and local codes including, but not limited to, the following:

1. CBC, California Building Code, and CMC, California Plumbing Code.
    a. Latest edition as adopted by the City of Los Angeles, the County of Los Angeles, and the State of California including amendments effective on the Effective Date of the Contract.
2. California Code of Regulations, Title 8, Industrial Relations, Division 1, Chapter 4, Division of Industrial Safety.

3OSHA - Occupational Safety and Health Administration.

4. CDPH - California Department of Public Health.
5. SCAQMD - South Coast Air Quality Management District.

C. Specifications or Drawings shall not be construed to permit deviation from the requirements of governing codes unless approval has been obtained from legally constituted authorities having jurisdiction, and the Architect. The Contract Documents may contain more stringent requirements than those legally required.

D. Permits and Fees: Refer to the General and Supplementary Conditions.

1.03 SUBMITTALS

A. Provide submittals in accordance with Section 01 3300: Submittal Procedures and with specific requirements of Division 22 sections, as applicable.

B. The above information shall become the basis for inspecting and testing materials and actual installation procedures performed in the Work.

C. Shop Drawings: Submit one additional copy when control diagrams having line voltage connections are indicated. Shop Drawings shall be specifically prepared for the Work of this Project. Drawings prepared in accordance with requirements of Section 01 3113: Project Coordination and Section 01 3300 may be provided by the Architect to serve as a background for the Shop Drawings. Shop Drawings shall comply with the requirements of Section 01 3113 and Section 01 3300 and shall indicate at a minimum:

1. Complete system layout of equipment, components, plumbing fixtures, piping, indicating service clearances, and pipe sizes, fitting types and sizes and pipe elevations, distances of pipes and equipment from building reference points and hanger support locations. The above items shall be coordinated on the shop drawings according to the requirements of Section 01 3113.

2. Schedule and description of equipment, piping and fittings.

1.04 PROJECT RECORD DOCUMENTS

A. Comply with provisions of Section 01 7700: Contract Closeout.

B. Project Record Drawings:

1. Provide a complete set of plumbing and fire protection drawings in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks and plotter pen color/line thickness settings on CD-ROM. Also submit one set of full size reproducible plots on vellum and 3 sets of prints.

2. Before Contract Completion, deliver corrected and completed prints to the OAR. Delivery of project record documents to the OAR does not relinquish responsibility of furnishing required information omitted from project record documents.

C. Operation and Maintenance Manuals:

1. Submit two copies of operation and maintenance manuals in required form and content. If no revisions are required, furnish one additional copy. If revisions are required, one copy shall be returned with instructions for changes; perform such changes and return three copies of manuals. Manuals shall be bound in accordance to Section 01 7700. Deliver manuals to the OAR. Submit an electronic copy of the entire manual in PDF file format.

2. Contents of Manual:

a. Title sheet with Project name, including names, addresses and telephone number of Contractor, installer, and related equipment suppliers.

b. Manufacturer's operating instructions including, but not limited to, the following:

1) Identification of components and controls.

2) Trouble shooting checklist and guidelines.

3) Recommendations for optimum performance.

4) Warnings and safety precautions on improper or hazardous operational procedures or conditions

c. Manufacturer's product data and parts and maintenance booklet for each item of equipment furnished under Division 22 that includes the following as a minimum:

1) Manufacturer’s model, identification and serial numbers.

2) Exploded view of assembly drawings identifying each component or part with the relevant part number.

3) Directory of manufacturer’s representatives, service contractors and part distributors.

4) Maintenance and trouble-shooting instructions, including schedule for preventive maintenance, periodic inspection and cleaning criteria.

d. Project Record Drawings: Complete set of plumbing, fire protection and control system drawings in 50 percent reduced print format shall be furnished with the manual. Submit the above record drawings on CD-ROM in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks, and plotter pen color/line thickness settings.

e. Testing, Adjusting, and Balancing reports: Submit as specified in Section 23 0593.

f. South Coast Air Quality Management District (SCAQMD) permits to install and operate boilers, water heaters and other fuel burning equipment and third-party source test reports as required by SCAQMD to allow start-up and operation of equipment.

g. Los Angeles County industrial waste permits.

h. Valve directory complete with location, function, size, and model of each valve with reference to the project record drawings.

i. Equipment and component identification chart complete with location, function, size, and model of each equipment or component with reference to the project record drawings.

1.05 COORDINATION

A. Contract Documents indicate extent and general arrangement of Work under Division 22. Contractor shall coordinate work in accordance with Section 01 3113 requirements and make adjustments as required to provide maximum headroom, a neat arrangement to keep passageways and openings clear to provide accessibility and provisions for maintenance, and to meet code requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Deliver materials to Project site in their original unopened containers with labels intact and legible at time of delivery. Store in strict accordance with manufacturer's recommendations.

B. Do not store plastic pipe or materials in direct sunlight.

1.07 PRELIMINARY OPERATION

A. OAR may require any portion of plumbing Work to be operated before Substantial Completion. Such operation shall be in addition to regular tests, demonstrations and instructions required under the Contract Documents, and shall be performed as required.

B. Notify the INSPECTOR at least 24 hours in advance of lighting or re-lighting pilots.

1.08 TRAINING OF OWNER PERSONNEL

A. Training of Owner’s personnel shall include:

1. A minimum of 4 hours of on-site overview of the overall Plumbing System.

2. Refer to Division 22 sections for specific training on each of the components of the Plumbing System.

B. Contract shall include the cost of training Owner operation and maintenance personnel in operating, adjusting, maintenance, trouble-shooting, and Project site repair of each component, equipment, or system provided under this Contract.

C. Operational and maintenance training shall be conducted on the Project site, unless indicated otherwise.

D. Upon completion of Owner training, a completion certificate indicating the nature of the training and a description of the systems, complete with equipment and component lists shall be issued to each trainee. The certificate should be issued in duplicate with one copy retained by OAR.

E. An attendance sheet with the names and signatures of all participants attending the training shall be submitted to the OAR and kept as part of the project documents.

1.09 GUARANTEES AND DAMAGE RESPONSIBILITY

A. Sound of water flowing in piping shall not be transmitted to building structure. Operation of mechanical system shall not produce operational sounds that can be heard outside of rooms enclosing apparatus or equipment.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Unless otherwise specified, materials and equipment shall be new, in good and clean condition. Equipment, materials, and components shall be of the make; type and model number noted on Drawings or specified. Pieces of equipment of the same type shall be by the same manufacturer.

B. Whenever an item is listed by a single proprietary name, with or without model number and type, it shall be for purpose of design only, to indicate characteristics and quality

desired. Proprietary designation listed on Drawings, or listed first in Specifications, is used as a basis for design to establish a standard for quality and performance and space requirements.

C. Equipment and materials indicated or required to be installed outdoors shall be of the type that is designed, manufactured, listed or approved by authorities having jurisdiction for outdoor installation by being resistant to the adverse effects of weather. The additional protective measures against outdoor weather required by the manufacturers' installation instructions and prevalent practice shall be provided.

D. For substitution of materials or products, refer to the General Conditions.

PART 3 – EXECUTION

3.01 SERVICE INTERRUPTIONS, OFF-SITE, GAS AND WATER

A. Schedule Work so there shall be no service interruptions of existing systems or systems during normal hours of operation of affected systems and facilities.

B. When service interruptions are mandatory, arrange in advance with the OAR as to time and date of such interruptions.

C. Systems, which are interrupted, shall be returned back into operation in such manner that they will function as originally intended.

3.02 CUTTING, NOTCHING, AND BACKING

A. Conform to California Building Code, Title 24, Part 2, for notches and bored holes in wood and for pipes and sleeves embedded in concrete and for cuts in steel, as detailed on structural Drawings.

B. Where pipes pass through, or are located within one inch of any construction element, install a resilient pad, ½ inch thick minimum, to prevent contact.

C. Furnish provisions for recesses, chases, and accesses and provide blocking and backing for proper reception and installation of plumbing Work.

3.03 LOCATION OF PIPING AND EQUIPMENT

A. Location of piping, apparatus and equipment indicated on the Drawings is approximate and shall be altered to avoid obstructions, preserve headroom, and provide free and clear openings and passageways.

B. Trenches parallel to footings shall not be closer than 18 inches to the face of footings and shall not be below a plane having a downward slope of 2 horizontal to one vertical, from a line 9 inches above bottom of footing.

C. Pipe in tunnels shall be installed close to one side of tunnel to provide maximum space for passage. Pipe shall not be installed through crawl hole unless otherwise specified or detailed on Drawings.

D. Place equipment in locations and spaces indicated, disassemble and/or reassemble equipment as required by Project conditions.

3.04 TESTS AND TESTING

A. Tests shall be as required under the applicable sections of Division 22, including this Section.

B. Additional tests may be required in the case of products, materials, and equipment if:

1. Submitted items are altered, changed, or cannot be determined as exactly conforming to the Contract Documents.

2. Performance testing and results may also be required on certain items which are as specified, including fan, and pump performance.

C. Piping Tests:

1. Perform tests required to demonstrate that operation of plumbing systems and their parts are in accordance with Specifications covering each item or system, and furnish materials, instruments and equipment necessary to conduct such tests. Tests shall be performed in presence of the Inspector, and representatives of any governmental agency having jurisdiction. Work shall not be concealed or covered until required results are provided.

2. If required tests are not performed, Owner may provide in accordance with the Contract Documents.

3. Pressure gauges furnished in testing shall comply with CPC. Air shall be bled from lines requiring hydrostatic or water tests.

4. Systems shall be pressure-tested in accordance with pipe testing schedule below. Pipe test shall indicate no loss in pressure after a minimum duration of 4 hours at test pressures indicated. Where local codes require higher test pressures than specified herein for fire sprinkler systems, local codes shall govern.

5. Fuel gas lines shall be first tested with piping exposed, before backfilling trenches or lathing; second with piping in finished arrangement, backfilled and paved where required, and walls finished.

6. Piping systems may be tested as a unit or in sections, but entire system shall successfully meet requirements specified herein, before final testing by the Inspector.

7. Repair of damage to pipes and their appurtenances or to any other structures resulting from or caused by these tests, shall be provided.

D. Pipe Testing Schedule:

System Tested	Test Pressure (psig)	Test With:
Durham system, glass or plastic acid waste, vent and roof drain (except pipes running under a slab or underground)	Fill with water to top of highest vent; allow to stand two hours, or longer, as required by Inspector. Minimum head required for any joint shall be 10 feet in building.	Water
Cast-iron soil, waste and interior downspout, condensate drain from air conditioning equipment	10 feet of water, vertically	

Storm water disposal lines	Running water test	Water
Vacuum pump or condensate pump discharge and condensate return piping	150	Water
Domestic water piping	200	Water
Standpipes, wet or dry	300	Water
Fire sprinkler piping	200	Water
Gas piping(steel threaded or plastic)	60 (both tests)	Air
Gas piping (steel welded)	100 (both tests)	Air
Gas welding station	1-1/2 Working pressure 100 min.	Dry nitrogen
Compressed air piping	175	Air

E. Equipment Performance Assurance Tests:

1. Before operating any equipment or systems, a thorough check shall be performed to determine that systems have been flushed and cleaned as required and that equipment has been properly installed, aligned, lubricated, and serviced. Factory instructions shall be checked to verify installations have been completed and recommended lubricants have been installed in bearings, gearboxes, crankcases, and similar equipment. Particular care shall be furnished in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Equipment shall also be checked for damage that may have occurred during shipment, after delivery, or during installation. Damaged equipment, products, and materials shall be replaced or repaired as required.

2. Upon completion of the above, adjust the system settings to within normal operating conditions to prevent the system from being damaged upon start-up.

3. Run-test the equipment after start-up for five consecutive days. Tests shall include operation of all equipment and systems for a period of not less than two 8 hour periods at 90 percent of the full specified capacities.

4. Equipment Start-up Reports: For each equipment or system on which start-up is performed, submit 8 copies of start-up report for review by the Architect.

   a. The start-up report shall include the manufacturer's standard start-up form completed and signed by the start-up technician.

5. Provide, maintain, and pay costs for equipment, instruments, and operating personnel as required for specified tests.

6. Provide electric energy and fuel required for tests.

7. Final adjustment to equipment or systems shall meet specified performance requirements.

8. Equipment, systems, or Work deemed defective during testing shall be replaced or corrected as required. Test until satisfactory results are provided.

F. Specific Coordinated Plan for Test and Balance:

1. Provide a narrative of the operational intent that clearly describes the function and sequence of operation of each component, equipment, or system installed. Instruct designated Owner personnel in the operation of the installed systems.

2. Prior to final test and balance, plumbing equipment and systems shall be operated and tested as indicated in Article 3.04.F above to demonstrate satisfactory overall operation of the installed systems.

3. Welding performed as part of this Division may be subject to radiographic inspections at random in accordance with requirements specified in Section 22 0513: Basic Plumbing Materials and Methods.

3.05 NOISE AND VIBRATION REDUCTION

A. Correct noise or vibration caused by plumbing systems. Provide all necessary adjustments to specified and installed equipment and accessories to reduce noise to the lowest possible level

B. Correct noise or vibration problems caused by failure to install work in accordance with Contract Documents. Include all labor and materials required as a result of such failure. Pay for re-testing of corrected noise or vibration problems by the project acoustical consultant including travel, lodging, test equipment expenses, etc.

3.06 PROTECTION, CARE AND CLEANING

A. In addition to storage criteria of the General Conditions, and provisions under Section 01 5000: Construction Facilities and Temporary Controls, the following shall be provided:

1. Provide for the safety and good condition of materials and equipment until Substantial Completion. Protect materials and equipment from damage.

2. Protect installed Work.

3. Replacements: In case of damage, immediately provide repairs and/or replacements as required.

4. Protect covering for bearings, open connections to tanks, pumps, compressors and similar equipment.

5. Interior of piping shall be maintained free of dirt, grit, dust, and other foreign materials.

6. Fixtures, piping, finished brass or bronze, and equipment shall have grease, adhesive, labels, and foreign materials removed. Chromium, nickel plate, polished bronze or brass Work shall be polished. Glass shall be cleaned inside and out.

7. Before initial start-up and again before Substantial Completion, piping shall be drained and flushed to completely remove grease and foreign matter. Pressure regulating assemblies, traps, strainers, boilers, flush valves, and similar items shall be thoroughly cleaned. Tag system with an information tag listing responsible party and date of element, before initial start-up and again before Substantial Completion. Compressed air, oil, and gas piping shall be blown out with oil-free compressed air or inert gas.

END OF SECTION

SECTION 22 0513

BASIC PLUMBING MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section prescribes basic materials and methods generally common to the Work of Division 22.

B. Related Requirements:

1. Division 01: General Requirements.

2. Division 22: Plumbing.

3. Division 23: HVAC.

4. Division 26: Electrical.

5. Division 33: Site Improvements.

1.02 SUBMITTALS

A. Provide in accordance with Division 01, Section 22 0500 and specific requirements of each section of Division 22.

B. Types of welding rods to be used.

1.03 QUALITY ASSURANCE

A. Standards: Comply with applicable national, state, and local codes and standards: ASTM, ASME, and ANSI. Federal Specifications, AWWA, CISPI, NFPA, FM, UL, CPC (California Plumbing Code), CMC (California Plumbing Code), CSA.

B. Conform to provisions of Section 22 0500: Common Work Results for Plumbing.

C. Manufacturer of plumbing products must be third-party certified to ANSI/NSF Standard 61, Section 9 certification, and ANSI/NSF 372 to demonstrate compliance with the federal requirements for lead contribution to drinking water, the Safe Drinking Water Act SDWA, and the California Health and Safety Code Section 116875.

D. Qualifications of Manufacturer: Products used in the Work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production as reviewed by the ARCHITECT.

1.04 COORDINATION

A. Coordinate related Work in accordance with provisions of Section 01 3113: Project Coordination.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide the following products if they are indicated in the Contract Documents or if they are required for the proper installation, function or operation of equipment, systems or components indicated in the Contract Document.

B. Provide the following products as a complete assembly with required accessories for a complete and functioning entity in compliance with governing codes and applicable standards as specified in Section 22 0500, manufacturer's instructions or as required.

1. Omission of minor details in the Contract Documents does not waive and/or otherwise relinquish compliance with the above requirements.

2.02 MANUFACTURERS AND MATERIALS

A. Ball Valves: 2-inch and smaller:

BV-1: Class 150, 600 psi, Bronze, CWP two piece construction with reinforced TFE seats, full port, adjustable packing gland, (no threaded stem designs allowed), threaded.

Manufacturer: Apollo Valves 77CLF-100A, NIBCO T-685-66-LF, Hammond UP8303A, Milwaukee UPBA400S, or equal.

BV-2: Class 150, 600 psi, Stainless Steel, CWP two piece construction with reinforced TFE seats, full port, adjustable packing gland, (no threaded stem designs allowed), threaded or solder ends.

Manufacturer: Apollo Valves 76F-100, NIBCO T-585-S6-R-66-LL, Milwaukee BA260, or equal.

Ball Valves in Insulated Piping: Use extended operating handle of non-thermal conducive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied. Apollo Valves Therma-Seal, NIBCO Nib-Seal Handle.

B. Butterfly Valves:

BFV-1 Centerline Series A, 200 psi CWP tight shut-off.

1. Body: Lug type ductile iron. Suitable for bi-directional dead-end service at rated pressure without use of downstream flange.

2. Disc: Bronze, or aluminum bronze.

3. Stem: One or two-piece, 400 series stainless steel.

4. Seat and O-Rings: EPDM.

5. Upper and Lower Stem Bearings: Copper alloy or non-metallic material.

6. Operators: Valves 6 inches and smaller, with lever handle. Valves 8 inches and larger, with manual gear operator and disc position indicator.

7. Manufacturers:

   a) Valves 2.5 to 6-inch: Apollo Valves LD141, Milwaukee ML 233E, Hammond 6411-03, or equal.

   b) Valves 8-inch and larger: Apollo Valves LD141, Milwaukee ML 333E, Hammond 6411-03, NIBCO LD 2000, or equal.

C. Check Valves:

1. Bronze, 2-inch and smaller:

   CHV-1: 200 psi, CWP horizontal swing, Y pattern, renewable seat and disc, threaded ends.

   Manufacturer: Apollo Valves 163T-LF, NIBCO T-413-Y-LF, Milwaukee UP-509, Hammond UP-904, or equal.

   CHV-2: 200 psi, CWP, bronze body, horizontal swing, Y pattern, renewable seat and disc, solder ends.

   Manufacturer: Apollo Valves 163S-LF, NIBCO S-413-Y-LF, Hammond Up-943, or equal.

   CHV-3: Class 125, 200 psi, swing check, bronze body, Teflon disc, soldered ends.

   Manufacturer: Apollo Valves 163S, Stockham B-310TY, Crane 1340, NIBCO S-413-Y, Milwaukee 1509-T, Hammond IB-912, or equal.

2. Cast Iron 2 1/2-inch and larger:

CHV-4: Class 125, 200 psi, CWP, IBBM, renewable seat and disc, bolted cap, flanged:

Manufacturer: Apollo Valves 910F, Crane 372, Stockham G-927, NIBCO T-918-B, or equal.

CHV-5: Special low-pressure check valve for installation in gas lines.

Manufacturer: Circle Seal Products Co., 119B-xPP; 0-15 psi; #1:1/8 inch IPS; #2:1/4 inch IPS #3:3/8 inch IPS.

D. Earthquake Valve:

EQV-1: Mechanically triggered by seismic movement, complying with state of California seismic response specifications, UL listed and certified by D.S.A. Size and pressure as required or indicated on Drawings. (Minimum 1/4 psi, maximum 10 psi. Earthquake valve shall shut off gas automatically during an earthquake to prevent an explosion or fire. Acceptable Manufacturers: California Valve (former Koso), or equal.

1. Not sensitive to vibrations caused by passing trucks or accidental bumping.
2. Sensitive to wide amplitude G's only. Preset at factory for the correct G-rating.
3. Positive sealing from minus 10 degrees F. to 150 degrees F.
4. Visual open-close indicator.
5. Manual reset.
6. Plumb line for mounting.
7. Tripping mechanism has non-creeping rolling latch.
8. Install valve per manufacturer’s recommendations only.

E. Expansion Tank:

ET-1: Pressurized, vertical, steel expansion tank for potable water systems with FDA approved, replaceable, heavy duty, butyl rubber blend diaphragm, polypropylene lined dome, 1/2 inch, 3/4 inch, 1 inch or 1 ½-inch NPT system connection, 1/2 inch or 3/4 inch drain, 0.302 inch-32 standard automobile tire valve type charging connection, lifting rings and a floor mounting skirt for vertical installation. The tank must be constructed in accordance with Section VII of the ASME Boiler and Pressure Vessel Code and stamped for 125 psi working pressure. The tank must be also rated for a continuous working temperature of 240 degrees F. Provide weather and rust resistant coating.

Manufacturer: Apollo Valves 16XT, Bell and Gossett, Wheatley, Taco, Amtrol, or equal.

F. Flow Control Valve – Manual:

FC-1: Flow control valves: Bell and Gossett Series CB circuit setter balancing valve, line size, with integral pointer (to register degree of valve opening), differential pressure meter connections with built-in check valves and lockable memory stops. Manufacturer: Apollo Valves 58A, Armstrong ARMFLO circuit-balancing valves, series CBV, or equal.

G. Gate Valves:

1. Bronze, 2-inch and smaller:

GV-1: Class 125, 200 psi, CWP, bronze body and bonnet, non-rising stem, inside screw, screw-in bonnet, solid disc, threaded ends:

Manufacturer: Apollo Valves 101T-LF, NIBCO T-113-LF, Milwaukee UP105-P2, Hammond UP645, or equal.

2. Iron, 2-1/2-inch and larger:

GV-3: Class 125 250 psi CWP iron body, flanged ends, bolted bonnet with wheel handle, resilient wedge, non-rising stem.

Manufacturer: Apollo Valves 610F-LFA, NIBCO F-619-RW, or equal.

GV-4: Class 125, 250 psi CWP iron body, flanged ends, bolted bonnet with 2-inch operating nut, resilient wedge, non-rising stem, fusion bonded epoxy coated.

Manufacturer: NIBCO F-619-RW-SON, or equal.

GV-5: Class 250, 250 psi, CWP, O S and Y, IBBM, resilient seat gate valve, flanged ends.

Manufacturer: Watts 408-OSYRW, or equal.

H. Globe Valves:

1. Bronze, 2-inch and smaller:

GLV-1: Class 125, 200 psi, CWP, screw-in bonnet, press ends:

Manufacturer: Apollo Valves 120T-LF, Milwaukee UP502-P2, Hammond UP440-P2, or equal.

GLV-2: Class 125, 200 psi, CWP, screw in bonnet, soldered ends.

Manufacturer: Apollo Valves 120S-LF, Hammond UP418, Milwaukee UP1502, or equal.

I. Water Heater Vent Pipe:

1. Schedule Number:

HVP-1 Shall be UL approved for service specified. Concealed heater vent pipe, including pipe in or through attic spaces, shall be Los Angeles City approved double wall metal vent pipe. For recessed wall heaters, furnish B.W. type. All others may be Type B, or B.W. Clearances must comply with Los Angeles City code and conditions of UL listing.

Manufacturer: American Metal Products Co., Inc., Simpson Dura-Vent, AmeriVent, Hart & Cooley Mfg. Co., Metalbestos, or equal.

HVP-2 For use in intake and exhaust of high efficiency condensing type gas water heaters only as required by manufacturer. Pipe shall be PVC, Schedule 40, extruded from 100 percent virgin polyvinyl Chloride (PVC) compound, meeting requirements of class 1254-13 of ASTM D1784. Manufacturer: Spears, Charlotte, or equal.
Fittings shall be Schedule 40 molded from PVC type I compound, conforming to the requirements of specification ASTM D2466.
Manufacturer: Spears, Charlotte, Harvel Plastics Inc., or equal.

J. Liquid Level Gage:

LLG-1 Refrigerant type, carbon steel with stainless steel trim or all forged steel construction, back-seating standard design. Upper and lower valve furnished with ball check valves; 1/2 inch diameter glass on center. Four 3/16 inch diameter gage glass guard rods or slotted steel guard.

Manufacturer: Peneberthy, Henry, Apollo Valves, or equal.

K. Piping and fittings:

1. Piping shall be continuously and permanently marked with manufacturer's name, type of material, size, pressure rating, and the applicable ASTM, ANSI, UL, or NSF listing. On plastic pipe, date of extrusion must also be marked.

2. Underground non-ferrous pressure pipes shall be installed with proper color tracer wires. Refer to color code provisions in Section 22 0553: Plumbing Identification.

P-1: Cast iron: Hubless, service weight, ASTM A888, CISPI 301, conforming to CISPI 310 and installed in accordance to IAPMO IS 6.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

PF-1a: Cast iron, soil or waste no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. 2 bands for size 1 ½-inch thru 4-inch, IAPMO, ASTM C 564 and CISPI 310.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

PF-1b: Cast iron, soil or waste, Heavy-duty no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. 4

bands for size 5-inch thru 10-inch. IAPMO, ASTM C564 and CISPI 310.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

PF-1c: Same as PF-1a with Heavy Duty Husky SD 4000 Coupling and stainless steel clamps. IAPMO, ASTM C564 and CISPI 310.

P-2: Galvanized steel, Schedule 40, ASTM A53.

Manufacturer: US Steel or equal.

PF-2: Malleable iron, Class 150, threaded, galvanized, beaded, ANSI B 16.3.

Manufacturer: Stockham, Stanley Flagg, Grinnell, or equal.

P-3: Copper drainage tube, inside structure and above grade. Type DWV hard temper, ASTM B 306.

Manufacturer: Mueller, Anaconda, Cerro Brass, Cambridge-Lee, Halstead, or equal.

PF-3: Cast brass drainage fittings ASA B 16.23, ASTM B 42.

Manufacturer: Mueller Brass, Nibco, Stanley Flagg, Lee Brass, or equal.

P-4: Copper water tube, Type L hard, ASTM B88. (For above ground use only.)

Manufacturer: Mueller, Cambridge-Lee, Halstead, or equal.

PF-4a: Copper Press-Connect pressure fittings, comply with ASME B16.51 “Copper Alloy Press-Connect Pressure Fittings”, with Ethylene Propylene Diene Monomer, EPDM O-Ring Seal in each end. Fittings with the sizes of 2-1/2” and larger shall have cross-section Grab Rings and separation rings.

Manufacturer: Viega, Mueller Industries, Apollo, or equal.

PF-4b: Wrought copper - solder type ANSI B 16.22.

Manufacturer: Mueller Brass, Nibco, Lee Brass, or equal.

PF-4c: Grooved end type– ASTM B75 or B152 and ANSI B16.22 wrought copper, bronze sand casting per ASTM B584-87 copper alloy CDA 836 per ANSIbB16.18. Couplings shall be CTS style 606 supplied with angle pattern bolt pads for rigidity, coated with copper coated alkyd enamel. Gaskets shall be pre-lubricated Flush seal type.

Manufacturer: Apollo Shurjoint, Victaulic, or equal.

P-5: Copper water tube, Type K hard, ASTM B88.

Manufacturer: Mueller, Cerro Brass, Cambridge-Lee, Halstead, or equal.

P-6: Type 316L Stainless Steel pipe, marked with manufacturer's identification and fittings. Manufacturer's representative shall instruct installers and certify them for joint installation. Piping system shall be provided with a five-year manufacturer’s material warranty.

Manufacturer: Viega or equal.

PF-6a: Type 316L Stainless Steel Mechanical joints. Stainless steel joint for chemical waste piping systems.

Manufacturer: Blucher, Josam, or equal.

PF-6b: Type 316L Stainless Steel Press Fittings. For condensate Drainage system provide with EPDM seals. For compressed air piping systems provide with HNBR seals. Manufacturer's representative shall instruct installers and certify them for joint installation.

Manufacturer: Viega, or equal.

P-7: Black steel pipe, Schedule 40, ASTM A53, Type E, ERW.

Manufacturer: US Steel, or equal.

PF-7a: Malleable iron, Class 125, ANSI B 16.3, threaded or welded Schedule 40 black steel for 2-inches and below and welded for 2 ½-inch and above.

Manufacturer: Stockham, or equal.

PF-7b: Grooved end type, ASTM A395 and A536 ductile iron; ASTM A234 WPB forged steel; fabricated from ASTM A53 carbon steel. Couplings shall be supplied with angle-pattern bolt pads for rigidity, except in locations where flexibility is desired. Gaskets shall be pre- lubricated.

Manufacturer: Apollo Shurjoint, Victaulic, Galvanized or painted, or equal.

PF-7c: Press fittings, ASME B31, Carbon Steel, – For aboveground piping 2-inches and below. Provide fittings with Hydrogenated Nitrile Butadiene Rubber, HNBR Sealing Element.

Manufacturer: Apollo Valves: Power Press, Viega: MegaPressG, or equal.

PF-7d: Malleable Iron, class 125, ANSI B 16.3, threaded schedule 80 black steel.

Manufacturer: Stockham, or equal.

P-8: Red seamless brass 85-5-5-5, iron pipe size (IPS), threaded pipe, ASTM B43.

Manufacturer: Mueller, Cerro Brass, Cambridge-Lee, Halstead, or equal.

PF-8: Bronze and brass, 250 psi, threaded, ASA B16.17 and F S WW-P-460.

Manufacturer: Mueller Brass, Lee Brass, or equal.

P-9: Underground site water service pipe sizes 4-inch and larger shall be C900 water service pipe material. Refer to guide specification section 33 1100 “site water distribution utilities”.

PF-9: Ductile Iron. Refer to guide specification section 33 1100 “site water distribution utilities”.

P-10: FRPP (Flame Retardant Polypropylene) schedule 80 chemical waste pipe, conforming to ASTM F1412 and ASTM D4101. The joints shall be Socket Fusion type. The installer shall be certified by the manufacturer for joint installation.

Manufacturer: Orion, or equal.

PF-10a: FRPP (Flame Retardant Polypropylene), schedule 40 DWV directional fittings including couplings. Joined using the socket fusion system conforming to ASTM 2657. The installer shall be certified by the manufacturer for this kind of joint installation.

Manufacturer: Orion, or equal.

P-11: PVDF (Polyvinylidene Fluoride) schedule 40 chemical waste pipe, conforming to ASTM F1673, ASTM D3222 and complying with UL723 (ASTM E84). The joints shall be no-hub mechanical Joints or Socket Fusion. The installer shall be certified by manufacturer for joint installation.
Manufacturer: Orion, or equal.

PF-11a: PVDF (Polyvinylidene Fluoride), schedule 40, No-hub coupling. Each coupling shall have 300 series stainless steel outer band and 5/16 inch bolts, nuts and washers plated to meet a 100-hour salt spray test per ASTM B117. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this type of joint installation.

Manufacturer: Orion, or equal.

PF-11b: PVDF (Polyvinylidene Fluoride), schedule 40 coupling. Joined using the socket fusion system conforming to ASTM 2657. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this kind of joint installation.

Manufacturer: Orion, or equal.

P-12: FRPP (Flame Retardant Polypropylene) schedule 40 chemical waste pipe, conforming to ASTM F1412 and ASTM D4101. The joints shall be no-hub mechanical joints or Socket Fusion type. Installer shall be certified by the manufacturer for joint installation.

Manufacturer: Orion, or equal.

PF-12a: FRPP (Flame Retardant Polypropylene), schedule 40, No-hub coupling. Each coupling shall have 300 series stainless steel outer band and 5/16-inch bolts, nuts and washers plated to meet a 100-hour salt spray test per ASTM B117. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this type of joint installation.

Manufacturer: Orion, or equal.

PF-12b: FRPP (Flame Retardant Polypropylene), schedule 40 coupling. Joined using the socket fusion system conforming to ASTM 2657. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this kind of joint installation.

Manufacturer: Orion, or equal.

P-13: Polyethylene plastic pipe, ASTM D 2513, Standard Dimension Ratio 11 rated at 80 psi working pressure and 73° Fahrenheit for 3 inches and smaller, SDR 11.5 rated at 76 psi and 73° Fahrenheit for 4 inches and above, butt or socket type fittings, joined by heat fusion, orange or yellow color. Installer shall be certified by the manufacturer for this kind of joint installation.

Manufacturer: CPCHEM (Chevron Phillips Chemical Company LP) PE 2406, or equal.

PF-13a: Polyethylene plastic fittings, ASTM D 3261 and D 2683, Standard Dimension Ratio 11 rated at 80 psi working pressure and 73° Fahrenheit for 3 inches and smaller, SDR 11.5 rated at 76 psi at 73° Fahrenheit for 4 inches and above, butt or socket type fittings, joined by heat fusion, Installer shall be certified by manufacturer for joint installation. Color orange or yellow.

Manufacturer: CPCHEM, (Chevron Phillips Chemical Company LP), or equal.

PF-13b: Polyethylene transition risers, for PF-13a above, Transition fitting must have a minimum vertical height of 36 inches from the horizontal connection which will allow for a 6-inch steel riser above ground. Polyethylene transition risers shall be anodeless.

Manufacturer: GF Piping Systems, or equal.

P-14: PVC, schedule 40, extruded from 100 percent virgin Polyvinyl Chloride (PVC) compound, meeting requirements of class 1254-13 of ASTM D1784. (Use for irrigation systems after the control valves only.)

Manufacturer: Spears, Charlotte, or equal.

PF-14 Plastic fittings, schedule 40 molded from PVC type I compound, conforming to the requirements of specification ASTM D2466.

Manufacturer: Spears, Charlotte, Harvel Plastics Inc., or equal.

a. PVC primer and solvent for chemical weld of pipe and fittings shall be as recommended by pipe manufacturer. Containers for solvent and primer shall be clearly marked with manufacturer's data. Solvent and primer shall not be more than one year old. The safety placards must be visible. Blue or red hot glue shall not be used.

1) Primer: Weld-On P-70 by IPS, Conforming to ASTM F656.

2) Cement: Weld-On 711 (gray) by IPS, Conforming to ASTM D2564.

P-15: Purple pipe, PVC, schedule 40 for reclaimed or recycled water (below ground only for non-potable irrigation systems), type 1, grade 1, PVC-1120, Cell Class 12454 B.

Manufacturer: Charlotte, or equal.

PF-15: Purple Plastic fittings, schedule 40 molded from PVC type I compound, conforming to the requirements of specification ASTM D2466. Refer to section 32 8426 “Reclaimed Water Irrigation”.

Manufacturer: Charlotte, or equal.

P-16: High Density Polyethylene pipe (HDPE) with tracer wire. Refer to guide specification section 33 1100 “site water distribution utilities”.

PF-16a: Butt Fusion HDPE Fittings. Refer to guide specification section 33 1100 “site water distribution utilities”.

PF-16b: Bolted Connections to HDPE pipes. Refer to guide specification section 33 1100 “site water distribution utilities”.

L. Pipe and Fitting Requirements Schedule: Unless otherwise specified or indicated on Drawings, pipe and fittings shall be installed in accordance with the following table:

TABLE I

PIPE AND FITTING SCHEDULE

Use	Limits	Pipe	Fittings
Compressed air	All sizes	P-6	PF-6

Use	Limits	Pipe	Fittings
Condensate drains and drains From HVAC Equipment	All sizes	P-4, or P-6 *Roof penetration & above, and exterior exposed piping shall be P-6 only	PF-4b, or PF-6b *Roof penetration & above, and exterior exposed piping shall be P-6 only
Domestic Cold Water, underground	Within 5’ from building, All sizes	P-5	PF-4a, or PF-4b
Domestic Cold Water, underground	Site distribution only, sizes up to 3”	P-5, or P-16 Refer to 33 1100	PF-4a, PF-4b, or P-16a, P-16b Refer to 33 1100
Domestic Cold Water, underground	Site distribution only, 4” and over	P-9 Refer to 33 1100	PF-9 Refer to 33 1100
Domestic Hot and Cold water, aboveground	Interior only	P-4	PF-4a, or PF-4b, Note: No FIP for stub outs is allowed, use Hi ear or drop ear cast brass 90 elbow.
Downspouts, Interior Storm Drainage	Within 5’ from building, All sizes	P-1	PF-1a, or PF-1b
Exposed Downspouts, Interior Storm Drainage	Existing Buildings and aboveground only	P-2	PF-2
Fire Mains (Fire Hydrants), Underground	Site distribution only, 4” and over	P-9 Refer to 33 1100	PF-9 Refer to 33 1100
Fire Suppression System, Interior	All sizes	P7 Refer to 21 1313	PF-7d Refer to 21 1313
Irrigation, After Backflow Preventer	All sizes	P14 Refer to 32 8413	PF-14 Refer to 32 8413
Irrigation, Meter to Backflow Preventer	Up to 4”	P-5 Refer to 33 1100	PF-4a, or PF-4b Refer to 33 1100
Irrigation, Meter to Backflow Preventer	4” and over	P-9 Refer to 33 1100	PF-9 Refer to 33 1100
Irrigation, Reclaimed Water or Recycled Water	All sizes	P15 Refer to 32 8426	PF-15 Refer to 32 8426
Natural Gas, Exterior	Underground, site only	P-13	PF-13a, and PF-13b
Natural Gas, Interior, aboveground	All sizes	P-7	PF-7a, PF-7b, or PF-7c
Vents - ACID,	All sizes	P-6, P-11, or P-12 *Roof penetration & above shall be P-6 only	PF-6a, PF-11a, PF-11b, PF-12a, or PF-12b *Roof penetration &

Use	Limits	Pipe	Fittings
			above: PF-6a only
Waste - ACID - Aboveground - Passing through Air Plenum	All sizes	P-11	PF-11a, or 11b
Waste - ACID - Aboveground	All sizes	P-12	PF-12a, or 12b
Waste - ACID - Underground	All sizes	P-10	PF-10
Waste - FORCED	All sizes	P-1	PF-1c
Waste and Vent - Indirect	All sizes	P-3	PF-3
Waste and Vent – Sanitary/ Grease	All sizes	P-1	PF-1a, or 1b
Waste and Vent – Sanitary/ Grease	Underground, site only	P-1 Refer to 33 3000	PF-1a, or 1b Refer to 33 3000

M. Pipe Isolators:

PLA-1 Absorption pad shall be not less than ½ inch thick, unloaded. Pad shall completely encompass pipe.

Manufacturer: Holdrite, LSP, Stoneman, Potter-Roemer, Trisolator, PR-Isolator, or equal.

Manufacturer: Hydra-Zorb Cushion Clamps, Acousto-Clamp, or equal.

N. Pressure Gage: Aluminum or steel case, minimum 4 ¼-inch dial; pressure type or combination vacuum-pressure type, with provisions for field calibration. Dial indicator to indicate pressure in psi with accuracy to within plus or minus 0.5 percent of maximum dial reading. Furnish gages with restriction screw, size 60, to eliminate vibration impulses. Black case and ring, bourdon tube of seamless copper alloy with brass tip and socket. Three way gage cock, constructed of brass with stuffing box, 1/2 inch couplings, with fixed or movable cap nut to shut off pressure gage.

PG-1 Pressure type, black drawn steel case, 4-1/2-inch glass dial, range approximately twice line pressure.

Manufacturer: Marsh Keckley, Trerice, Weksler, Weiss, or equal.

O. Plug Valves:

PV-1 2 inches and smaller: Rockwell No.114, lubricated plug type, 200-pound., water operating gauge pressure iron body and plug, regular pattern, threaded, with indicating arc.

Manufacturer: Walworth, Homestead, WKM, or equal.

PV-2. 2 ½-inch and larger: Rockwell No.115 and No.165 lubricated plug type, 200 pound water operating gauge. Iron body and plug, regular pattern, flanged, with indicating arc.

Manufacturer: Walworth, Homestead, WKM, or equal.

P. Safety Relief Valves:

SRV-1: Combination temperature and pressure relief type. CSA approved. Set to open at 125 psi pressure.

Manufacturer: Apollo Valves: 18C, Watts: 40L, Cash-Acme: NCLX-1, or equal.

SRV-2: Same as SRV-1, except provide on storage type water heater with anode in dip tube.

Manufacturer: Apollo Valves: 18C, Watts: 100XL, Cash-Acme: NCLX-1, or equal.

SRV-3 Spring type, ASME and NB stamped and certified with manual lifting device for air or gas.

Manufacturer: Apollo Valves, Bailey, Cash-Acme, Watts, Keckley, or equal.

Q. Strainers:

STR-1 Description: Wye type with monel or stainless steel strainer cylinder (manufacturer's standard mesh), and gasketed machine strainer cap. Where indicated on Drawings, provide with valved (globe valve) blowout piping, same size as blowout plug.

1. 2-inch and smaller:
   C.M. Bailey No.100-A, 250 lb., cast iron body, threaded, Keckley: Style B, Spirax Sarco Y-type, or equal.

2. 2 ½-inch and larger:
   C.M. Bailey No.100-A, 125 lb., cast iron body, flanged, or Victaulic style 732, 300 psi, ductile iron body, grooved, fusion bonded epoxy coated.

   Manufacturer: C.M.Bailey, Armstrong, Muessco, Keckley 'A', or equal.

STR-2 Y pattern cast iron bodies, 125 psi, monel screen. Open area at least twice the cross-sectional area of IPS pipe in which strainer is installed and may be woven wire or perforated type. Screwed ends for sizes up to 2 inches, flanged ends fusion bonded epoxy coated for 2 ½-inch and larger perforations, in accordance with the following:

1. Steam service - 40 square mesh.

2. Other services - 16 square mesh.

Bailey No.100, Armstrong, RP&C, Keckley or equal.

STR-3 Flanged, bucket type, semi-steel body, 125 psi, stainless steel screen with 1/8 inch diameter perforations, all sizes.

Manufacturer: Bailey No.1, Zurn 150 Series, RP&C, Keckley GFV, or equal.

STR-4 Grooved, T-pattern, ductile iron body, 300 psi, stainless steel frame and mesh basket, grooved ends.

R. Vent Caps:

VC-1 Vandal-proof hood type, for plumbing vent lines.

Manufacturers: ZURN Z193, MIFAB R1930, or equal.

S. Vacuum Valves:

VV-1 Vacuum valves; for vacuum serve, 125 psig working pressure, cast iron body, spring loaded lubricated plug type.

Manufacturer: General Controls, Honeywell, Valmatic, or equal.

T. Protective Coating for Underground Steel Piping Applied to Underground Automotive:

1. Black steel or galvanized steel piping indicated for below grade installation, shall be protected as specified prior to delivery to the Project site:

   a. Sandblast black steel pipe to a gray finish. Sandblast galvanized steel pipe lightly only.

   b. Install one coat of cut back asphalt to galvanized pipe immediately after sandblasting. Pre-heat black pipe to 180 degrees F. immediately before coating.

   c. Install one coat of high-temperature (melting point of 240 degrees F. minimum) Grade B asphalt enamel.

   d. Install one wrapping of 20 mils thick glass, fiber mat, Owens-Corning Coromat or L.O.F. Blueflag with 1/4 inch overwrap. Glass fiber shall be dry at time of installation.

   e. Install a second coat of asphalt enamel as specified above. Glass fiber mat shall be centered in the asphalt enamel.

   f. Install an overwrap of Kraft ripple paper.

2. Total thickness of pipe wrapping shall be not less than 1/8 inch. Entire coating operation shall be accomplished by mechanical means in a continuous operation. Hand installation of protective coating is not permitted.

3. Each piece of wrapped pipe shall be legibly identified at no greater than 5 feet intervals by fabrication company. Each material submittal shall include the name of the fabrication company. Maintain one reviewed Sample on the Project Site.

4. Acceptable manufacturers of wrapping are: Hunt, Mobile, Conway or equal.

5. Fittings (including couplings), unprotected pipe adjacent to fittings, and damaged pipe protection shall be wrapped at Project site as follows:

   a. Fittings and pipe to be wrapped shall be thoroughly cleaned of material foreign to pipe manufacturer.

   b. Install one coat of Plicoflex No. 105 or Protecto Wrap No. 1170 adhesive primer to metal.

   c. Wrap pipe and fittings with a minimum thickness of 3/32 inch of Plicoflex No. 310 pipe line butyl molding tape, or Protecto Wrap No. 200 molding tape. Install 3 layers, each layer overlapping next approximately 2/3 width of tape, without stretching. Tape and primer shall be of the same manufacturer.

   d. Wrap vinyl tape, 10 mil thickness, over molding tape with 1 inch minimum overlap.

      Manufacturer: J.M. Trantex, 3M Scotchwrap or equal.

5. Pipe and fittings specified to be wrapped shall be tested with a holiday detector, after pipe has been installed in trench and before backfilling, in presence of the Project Inspector. Furnish a Tinkler and Raser model E-P holiday detector, or similar equipment for this test. Work, which is deemed defective, shall be repaired or replaced. The Project Inspector may test for damaged pipe wrapping after backfilling.

6. Instead of wrapping underground steel pipe as specified above, pipe may be machine-wrapped before delivery to the Project site as follows:

   a. Pipe shall be cleaned of moisture, oil, grease, scale, and other foreign material by cleaning with non-oily solvent and wire brushing. Remove metal burrs and projections.

   b. Install one coat of Plicoflex No.105 adhesive primer to cleaned pipe. If thinning is required, furnish only non-oily thinners as recommended by tape manufacturer.

   c. Wrap coated pipe with Plicoflex No.340-25 tape (15 mil butyl and 10 mil vinyl laminate) Tape shall be installed by machine wrapping at approved plant only. Maintain tension (minimum of 5 pounds per inch

of width) on tape over entire diameter of pipe. Tape shall be permanently identified and visible on vinyl side.

d. Fittings, unprotected pipe, and damaged pipe protection shall be wrapped as indicated above.

U. Flanges: Flanges shall be furnished and installed at each flanged connection of each type of equipment, tanks, and valves. Faces of flanges being connected shall be furnished alike. Connection of a raised face flange to a flat-faced flange is not permitted. Flanges shall conform to following schedules:

TYPE OF PIPE	FLANGE
Screwed black or galvanized grooved steel pipelines.	125-pound black cast iron screwed flange, flat faced or grooved flange adapters, Victaulic Style 741, Tyco-Grinnell Fig. 71, Gruvlok Fig. 7401, or equal.
Welded or grooved steel pipe, except high pressure steam lines.	150-pound black forged steel welding flanges, 1/16 inch raised face ASTM A 105, Grade II or grooved flange adapters, Apollo Shurjoint 7041, Victaulic Style 741, Tyco-Grinnell Fig. 71, Gruvlok Fig. 7401, or equal.
Copper and brass pipe or tubing.	150 pound cast bronze, flat-faced flange with solder end or grooved flange adapters, Apollo Shurjoint C341, Victaulic Style 641, Tyco-Grinnell Fig. 61, Gruvlok Fig. 6084, or equal.

1. Gasket material for flanged connections shall be full faced or ring type to suit facing on flanges and shall be furnished in accordance with following schedule:

SERVICE	TYPE
Cold water	1/16-inch-thick neoprene

Grooved end flange adapters supplied with pressure responsive elastomeric Gaskets supplied with grooved flange adapters shall be pre-lubricated by the manufacturer. Grade of gasket to suit intended service.

V. Unions:

1. Unions shall be furnished and installed in accordance with the following requirements (unless flanges are furnished):

a. At each threaded or soldered connection to equipment and tanks, except in Freon or fuel gas, piping systems, whether indicated or not.

b. Immediately downstream of any threaded connection to each manually operated threaded valve or cock, and each threaded check valve, yard box or access box except those in Freon piping systems, whether indicated or not.

c. At each threaded connection to threaded automatic valves (except those in Freon piping systems) such as reducing valves and temperature control valves, whether indicated or not.

d. If grooved piping is used, couplings shall serve as unions. Additional unions are not required

2. Unions shall be located so that piping can be easily disconnected for removal of equipment, tank, or valve.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which Work of this Section shall be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Provide all materials and equipment for the Work. Furnish and install necessary apparatus, parts, materials, and accessories.

B. Pipe Installation:

1. Install piping parallel to wall and provide an orderly grouping of proper materials and execution.

2. Piping shall clear obstructions, preserve headroom, provide openings and passageways clear, whether indicated or not. Verify the Work of other Divisions to avoid interference.

3. If obstructions or the Work of other Divisions prevent installation of piping or equipment as indicated by the Drawings, perform minor deviations as required by the ARCHITECT.

4. Install piping after excavation or cutting has been performed. Piping shall not be permanently enclosed, furred in, or covered before required inspection and testing is performed.

5. Exposed polished or enameled connections from fixtures or equipment shall be installed with no resulting tool marks or threads at fittings. Residue or exposed pipe compound shall be removed from exterior of pipe.

6. Piping shall be concealed in chases, partitions, walls, and between floors, unless otherwise directed or specifically noted on Drawings. When penetrating wood studs, joists, and other wood members, provide such members with reinforcement steel straps of Continental Steel & Tube Co., ULINE, Independent Metal Strap, or equal.

7. Reduce fitting where any change in pipe size occurs. Bushings shall not be furnished unless specifically reviewed by the ARCHITECT, or indicated on Drawings.

8. Piping subject to expansion or contraction shall be anchored in a manner, which permits strains to be evenly distributed. Swing joints or expansion loops shall be installed. Seismic restraints shall be installed so as not to interfere with expansion and contraction of piping. Seismic loops required at all building separations.

9. Immediately after lines have been installed, openings shall be capped or plugged to prevent entrance of foreign materials. Caps shall be left in place until removal is necessary for completion of installation.

10. Couplings shall not be installed except where required pipe runs between other fittings are longer than standard length of type of pipe being installed and except where their installation is specifically reviewed by the ARCHITECT.

11. Water piping shall be installed generally level, free of traps, unnecessary offset, arranged to conform to building requirements, clear of ducts, flues, conduits, and other Work. Piping shall be arranged with valves installed to provide for complete drainage and control of system. Piping shall not be installed which causes an objectionable noise from flow of water therein under normal conditions. Refer to Section 23 0500: Common Work Results for Plumbing.

12. Water lines may be installed in same trench with sewer lines, provided bottom of water line is 12 inches minimum above top and to the side of sewer line.

13. Changes in pipe sizes shall be furnished with eccentric reducers, flat on top. Offsets to clear obstruction shall not be installed so as to produce air pockets.

C. Pipe Sleeves and Plates:

1. Provide pipe sleeves of Schedule 40 black steel pipe or Schedule 40 PVC plastic pipe in concrete or masonry walls, footings, and concrete floors below grade. Provide adjustable submerged deck type sleeves at locations where pipes pass through concrete floors, except concrete slab floors on grade, and at

locations where soil pipe for floor type water closets passes through concrete floors.

2. Sleeves shall provide ½ inch clearance around pipes, except plastic pipe shall have 1 inch clearance. Caps of deck type sleeves shall be removed just prior to installation of pipe. Area around sleeves shall be smooth and without high or low spots. Sleeves in walls shall not extend beyond exposed surface of wall. Sleeves in concrete floors and walls shall be securely fastened to forms to prevent movement while concrete is being placed.

3. Piping installed on a roof shall clear the roof surface by 10 inches minimum, with or without insulation. Bottom of individual fittings may infringe on 10 inches clear space but not groups of fittings or fittings located within 27 inches of each other.

4. Stiles shall be provided to facilitate crossing of piping when parallel piping runs are laterally greater than 12 inches out-to-out, or any pipe is higher than 18 inches, and more than 40 feet long or runs between two or more major pieces of equipment or housings greater than 20 feet apart. Stiles shall be not less than 20 inches wide with a minimum tread depth of 10 inches. Where stiles are required, they shall be located so greatest obstructed distance is 30 feet.

5. Where pipes pass through waterproofed walls, floors, or floors on grade, sealant with Link-Seal Modular Seals, or equal, between pipe and sleeve to provide a waterproof joint. Where earth is in contact with pipe on both sides of a wall or foundation, the waterproof joint is not required. Commercial rubber compression units may be furnished instead of sealed sleeves if reviewed by the ARCHITECT.

6. A swing joint, or other required device, shall be furnished and installed in hot water lines with 10 feet of sealant or compression joint to allow for expansion.

7. Provide polished, chrome-plated flanges when plumbing pipes pass through walls at plumbing fixtures, etcetera as specified in Section 22 1000 Plumbing. Provide polished steel, chromium-plated split floor and ceiling plates at locations where pipes pass through walls, floors, ceilings, and partitions in finished portion that neatly conceals pipe insert.

8. Pipe sleeves shall be provided where pipes intersect footings or foundation walls and sleeve clearances shall provide for footing settlement, but not less than one inch all around pipe.

D. Welding of Pipe and Qualifications of Welder:

1. Joints above grade or accessible conduit or tunnels in steel piping may be either welded or screwed unless specifically indicated otherwise on Drawings

or specified. Joints in below grade steel piping, whether in insulation or not, shall not be welded, unless otherwise indicated.

2. Welded joints in pipe shall be continuous around pipe and shall comply with ASME B31: Code for Pressure Piping, unless otherwise specified.

3. Each pipe weld shall be stamped with welder's identification mark. Welding shall be performed by welders possessing a valid certificate of qualification for welding carbon steel welding pipe in horizontal position (2G) and horizontal fixed position (5G) in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code, by an OWNER-recognized, DSA approved testing laboratory.

4. Before any welder performs welding on the Work, furnish the INSPECTOR with a copy of welder's valid qualification papers and obtain verification. Welder qualification is not valid unless it has been issued while welder was performing work for current employer, and has performed type of work described by qualification in the preceding 3 months.

5. Welding performed under these Specifications is subject to special tests and inspections including rigid Ultra Sonic Testing (UT) and radiographic inspection at random, in accordance with Technique for Radiographic Examination of Welded Joints by an OWNER recognized, DSA approved testing laboratory.

E. Unacceptable Welds and Repairs to Welding:

1. Welds containing any of the following types of imperfections shall be deemed defective Work:

a. Cracks of any type.

b. Zones of incomplete (in excess of 1/32 inch) fusion or penetration.

c. Elongated slab inclusions longer than 1/4 inch.

d. Groups of slag inclusions in welds having an aggregate length greater than thickness of parent metal in a length 12 times the thickness of the parent metal.

e. Undercuts greater than 1/32 inch.

f. Overlaps, abrupt ridges or valleys.

3. When a defective weld is detected by examination as outlined above, two additional welds shall be radiographed at locations selected by the Project Inspector. If the two selected welds demonstrate compliant welding, then the two tested welds shall be deemed to be in compliance. Welding revealed by

radiographs to be defective Work shall be removed, repaired, and tested by radiograph.

4. If either of the two selected welds demonstrates welding deemed to be defective Work, all welding in that portion of the Work shall be deemed defective Work and either: all welds shall be cutout, prepare new ends for welding and weld to comply with this Specification, or radiograph all welds, removing and repairing only such welding deemed to be defective Work.

5. Repair welding shall be performed in a manner in full compliance with ASME B31. The welded joints or repairs shall be spot examined with UT or radiographic tests in accordance with foregoing requirements.

6. OWNER shall cause to be performed additional random UT and radiographic examinations of welds. OWNER shall be responsible for the costs of any UT and radiographic examinations found to be in compliance with specified requirements.

7. Installer shall be responsible for the costs of UT and radiographic re-examinations of welds deemed defective Work and not in compliance with this Specification, and shall repair or replace said welds in accordance with specified requirements.

F. Welding Rods: Submit a written list of materials and proposed type of welding rods.

G. Backing Rings: Backing rings may be submitted for installation provided the Product Data is submitted with the material list.

H. Qualification Tests for Low-pressure Welding:

1. Tests shall be performed on 3-inch standard weight pipe ASTM A53, Grade A, and shall be welded by acetylene and electric arc. Each sample shall consist of 2 pieces, each 10 inches long, with 30-degree bevel at point weld.

2. Two 20-inch samples shall be performed in the 2G and two 20-inch samples in the 5G positions, with positions defined in Section IX, ASME Boiler and Pressure Vessel Code. Welds shall have the reinforcement ground or machined flush to the surface of the pipe before testing. Samples shall be tested as full section tensile.

3. Weld shall develop a load of 90 percent of 50,000 psi, i.e., 45,000 psi or shall develop a fracture in parent metal.

4. Each qualified welder shall carry an identification card listing welder's name, date of test, and type of welding tests passed; signed by the welder and the laboratory.

5. A valid certificate of qualification issued in compliance with requirements of the ASME Boiler Pressure Vessel Code Section IX shall qualify a welder for issuance of a certificate for low-pressure pipe welding.

I. Certificates of Qualification for Welding of Unfired Pressure Vessels:

1. Certificates of qualification shall be issued by a laboratory recognized by the OWNER in compliance with the requirements of the ASME Boiler Pressure Vessel Code Section IX. Qualifications shall be for both acetylene and arc welding of Schedule 40 ASTM A53, Type B, steel welded or seamless pipe in the Horizontal Position (2G) and the Horizontal Fixed Position (5G) as defined by said code.

2. Certificate described above is not valid unless it has been issued while welder was working for his current employer, and unless welder has performed type of work described by certificate in the preceding three months. Requirements for possession of a valid certificate shall not be waived for welders fabricating unfired pressure vessels when the Specifications require compliance with ASME code or when welding pipe carries working pressures greater than 75 psi and temperatures greater than 250 degrees F.

J. Pipe Joints and Connections:

1. Pipe and tubing shall be cut per IAPMO Installation Standards. Pipe shall have rough edges or burrs removed so that a smooth and unobstructed flow shall be provided.

2. Hot tapping of gas lines is strictly prohibited.

3. Threaded Pipe: Joints in piping shall be installed according to the following service schedule:

a. Soap Piping: Litharge and glycerin, or Expando, Gasoila, or equal.

b. Plastic Piping: Teflon pipe joint compound tape.

c. Oxygen Piping: Wash treads with S.P., rinse, blow-dry and apply litharge and glycerin.

d. Cleanout Plugs: No compound shall be used. After inspection and test, plugs shall be removed, cleaned, greased, and replaced.

e. Other services furnish sealant, suitable and as reviewed by the ARCHITECT.

4. Threads on pipe shall be cut with sharp, clean, unblemished dies and shall conform to ANSI/ASME B2.1 for tapered pipe threads.

5. Joint compounds shall be smoothly placed on male thread and not in fittings. Threaded joints shall be installed tight with tongs or wrenches and sealant of any kind is not permitted. Failed joints shall be replaced with new materials. Installation of thread cement or sealant to repair a leaking joint is not permitted.

6. Sharp-toothed Stillson, or similar wrenches, is not permitted for the installation of brass pipe or other piping with similar finished surfaces.

K. Copper Tubing and Brass Pipe with Threadless Fittings:

1. Silver brazed joints shall be used for attaching fittings to non-ferrous metallic refrigerant piping.

2. Non-pressure gravity fed condensate lines may be soldered with 95/5 solder.

3. Silver brazing alloy, Class BCUP-5. Surfaces to be joined shall be free of oil, grease, and oxides. Socket of fitting and end of pipe shall be thoroughly cleaned with emery cloth and wiped to remove oxides. After cleaning and before assembly or heating, flux shall be installed to each joint surface and spread evenly. Heat shall be applied in accordance with instructions in the Copper Tube Handbook issued by Copper Development Associates. Joints constructed of rough bronze fittings shall be provided as recommended by manufacturer.

4. Do not overheat piping and fittings when installing silver brazing.

5. Joints in non-ferrous piping for services not covered above shall be installed with solder composed of 95/5 tin/antimony, ASTM B32, Grade 5A. Surfaces to be jointed shall be free of oil, grease, and oxides. Sockets of fitting and end of pipe shall be cleaned with emery cloth to remove oxides. Solder flux shall be sparingly installed and solder added until joint is completely filled. Do not overheat. Excess solder, while plastic, shall be removed with a small brush in order to provide an uninterrupted fillet completely around joint. Random inspection of joints shall be conducted by Project Inspector to ensure joints are lead-free.

6. Grooved end joints for copper piping shall be assembled in accordance with the latest manufacturer recommendations. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. Grooving tools shall be as manufactured by Victaulic, RIDGID, MAG Tool, or equal.

7. Pressed fittings for copper or copper alloy pipe or tubing shall have an elastomeric O-ring that forms the joint. The pipe or tubing shall be fully inserted into the fitting, and the pipe or tubing marked at the shoulder of the fitting. Pipe or tubing shall be cut square, mechanically cleaned and reamed prior to joining to remove all burrs (interior and exterior) and restore full inside

diameter and a smooth, chamfered exterior surface. The fitting alignment shall be checked against the mark on the pipe or tubing to ensure the pipe or tubing is inserted into the fitting. The joint shall be pressed using the tool recommended by the manufacturer.

a. Press Installation Training Requirement: Installation training shall be provided on site by manufacturer personnel and documented with Engineer. Installation procedures, depth guides, and tool inspection shall be provided by manufacturer for all product types (steel or copper) for reference and safety assurance.

L. Ring-Type Pipe: Joints shall be installed in accordance with manufacturer's instructions with grooved couplings, fittings and rubber rings. Couplings and pipe shall be compatible and of the same manufacturer. Rings shall be accurately located and installed by grooves in coupling. Pipe shall be installed with zero deflection unless otherwise specified. Pressure pipe shall be furnished with thrust blocks at each offset point.

M. Welded Pipe Joints:

1. Joints in welded steel pipelines shall be installed by oxyacetylene or electric arc process. Welding shall be continuous around pipe and provided as specified.

2. Butt welds shall be of the single V-type, with ends of pipe and fittings beveled approximately 37 ½ degrees. Piping shall be aligned before welding is started with the alignment maintained during welding.

3. Welds for flanges and socket fittings shall be of the fillet type with a throat dimension not less than pipe wall thickness.

N. Grooved End Pipe Joints: Grooved end joints for carbon steel piping shall be assembled in accordance with the latest manufacturer recommendations. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to grove for proper gasket sealing. Grooving tools shall be as manufactured by Victaulic, RIDGID, MAG Tool, or equal.

O. Stainless steel press joints: Joints shall be Vic-Press 304TM, or equal, made with Victaulic Series ‘PFT’ tools and the appropriate sized jaw. Pipe shall be certified for use with Vic-Press 304TM system, and shall be square cut, properly deburred and cleaned, and marked at the required location to insure full insertion into the fittings and/or couplings.

P. Polyethylene (Plastic) Pipe:

1. Joints shall be installed by the heat fusion method, in accordance with manufacturer's recommendations and IAPMO installation standard IS 12, for natural gas.

2. Pipe Riser at Meter, Regulator and Building Wall: Prefabricated, anodeless type, utilizing a grade level transition between underground polyethylene pipe and gas supply steel pipe of riser outlet, GF Piping Systems, or equal. Below grade to above grade transition shall be installed in a welded, epoxy coated, steel casing.

3. Connections to Existing Pipe Line or Branch:

   a. Steel-to-plastic (PE): Provide manufacturer's prefabricated standard transition fitting, transition from epoxy-coated steel pipe to plastic, R. W. Lyall Co., or equal.

   b. Plastic-to-plastic, PVC to PE: Provide manufacturer's prefabricated standard transition fitting, transition from PVC to epoxy-coated steel pipe to PE; R.W. Lyall Co., or equal.

   c. Plastic-to-plastic, PE to PE: Provide manufacturer's standard fused tapping tee assembly with shut-off feature.

4. Provide PE reinforcing sleeves where PE pipe is fused to multi-saddles, service punch tee, reducing tees, transition fittings and anodeless risers.

Q. Valves: Valves shall conform to the following:

1. Piping systems shall be furnished with valves at points indicated on Drawings and specified, arranged to provide complete regulating control of piping system throughout building and the Project site.

2. Valves shall be installed in a neat grouping, so that parts are easily accessible and maintained.

3. Valves shall be full size of line in which they are installed, unless otherwise indicated on Drawings or otherwise specified, and shall be one of types specified.

4. Provide chain operators on valves 2-inch and larger located 7 feet or more above the servicing floor level.

5. Valves for similar service shall be of one manufacturer.

6. Except where otherwise specified, valves shall be Apollo, Belimo, Victaulic, Stockham, Crane, Jenkins, Milwaukee, Hammond, American, NIBCO, Hoffman, or equal.

7. Ball valves below grade are not allowed.

8. Hose bibs in dense garden areas and lunch pavilions shall be ¾ inch in size with 1 inch line size serving lunch pavilion hose bibb. Other hose bibs shall be

¾ inch lock shield type. Bibs shall be furnished with vacuum breaker protection.

9. Safety valves and pressure relief valves shall have stamp of approval as required by ASME and shall be provided with annual test lever. Where a hot water storage tank is heated by means of a coil, pressure relief valve shall have a steam BTU discharge rating of the coil. Discharge pipe from safety or pressure relief valves shall be not less than one pipe size larger than inlet pipe size of valve. Discharge pipe shall terminate as indicated and shall be free of traps. In addition to locations specified, pressure relief valves shall be installed in the following locations:

    a. On discharge side of each pressure-reducing valve.

    b. On each water heater connected to a hot water storage tank and other pressure vessels.

    c. On cold water line to each water heater or hot water storage tank when there is a check valve, backflow prevention valve or similar device between water heater or hot water storage tank and meter or relief valve at the pressure reducing valve assembly.

    d. On discharge side of each air compressor.

    e. On each air receiver connected to an air compressor.

10. Temperature relief valves and combination temperature and pressure relief valves shall be as specified and furnished as set forth in this Section. Discharge pipe from relief valves shall be not less than discharge area of valve or valves it connects, based on discharge area of valves, and shall terminate as indicated and free of any traps. Valves shall be installed at following locations:

11. A combination temperature and pressure relief valve or combination of valves on each heating hot water storage tank. Temperature sending element shall extend into water inside tank.

12. Manual air vent valve assemblies shall be installed at each high point of hot water space heating and chilled water piping systems. Valves shall discharge through 1/4 inch diameter copper tubing and drain to nearest floor sink. Automatic type air vent valve shall only be installed where specifically indicated. Radiator, convectors, and finned pipe convectors shall be fitted with packless radiator valves, angle or straight pattern. Each convector or radiator installed as part of a space hot water heating system shall be furnished with a manual-type air vent valve.

13. Maximum 2 valves are allowed to be installed within access panel, install the valve easily accessible/operational.

R. Strainers: Strainers shall be installed on each water main (except for fire line) downstream of the meter, above grade, when a pressure regulator assembly is not installed. Main strainer shall be of Y-flange or groove type. On closed loop chilled and heating hot water systems pump systems, a strainer shall be installed at each pump inlet and upstream of each flow control valve assembly. The control valve assembly may include a modulating temperature control valve and a flow-limiting valve, manufactured by Griswold, AutoFlow, Flow Control Industries, Inc., or equal.

S. Hangers and Supports:

1. Piping shall be securely fastened to building structure by approved iron hangers, supports, guides, anchors, and sway braces to maintain pipe alignment to prevent sagging and to prevent noise or excessive strain on piping due to uncontrolled or seismic movement under operating conditions. Hangers and supports shall conform to Manufacturer's Standardization Society Specification SP-69. Hangers shall be relocated as required to correct unsatisfactory conditions that may become evident when system is placed into operation. Appliances, heat exchangers, storage tanks, and similar equipment shall be securely fastened to structure in accordance with seismic requirements. Outdoor metal hangers and supports shall be hot-dipped galvanized steel, unless otherwise specified.

2. Hose faucets, compressed air outlets, and similar items at ends of pipe branches shall be rigidly fastened to building construction near point of connection.

3. Piping shall not be supported by wire, rope, wood, plumbers' tape, or other non-recognized devices.

4. Hangers and supports shall be designed to support weight of pipe, fittings, weight of fluid and weight of pipe insulation, and shall have a minimum factor of safety of five, based on ultimate tensile strength of material installed.

5. Burning or welding of any structural member under load is not permitted. Field welding not specified on Drawings or reviewed Shop Drawings is not permitted without review by ARCHITECT and DSA.

6. Burning holes in beam flanges or other structural members is not permitted without review by the ARCHITECT and DSA.

7. Pipe hangers on piping covered with low temperature insulation shall be installed on outside of insulation and not in contact with pipe unless otherwise detailed on Drawings. Insulation shall be protected by 18 gage galvanized steel shield, with a minimum length of 10 inches, installed completely around pipe covering between covering and hanger. Installing hangers directly on pipe and butting adjoining sections of insulation against hanger is permitted provided void and hanger rod are properly insulated and sealed so that no sweating occurs at hangers.

8. Hanger rods shall be fastened to structural steel members with suitable beam clamps. Clamps shall be Tolco, Carpenter & Patterson, Fee and Mason, or equal, as follows:

    a. Tolco I beam, Fig.62 for maximum 1000 pounds.

    b. Tolco I or WF beam, Fig. 329, for maximum of 1290 pounds.

9. Hanger rods shall be fastened to concrete inserts in concrete slabs or beams. Inserts shall be Tolco, Carpenter & Patterson, Fee and Mason, or equal, as follows:

    a. Tolco Fig.310 for maximum of 600 pounds.

    b. Tolco Fig. 309 for maximum of 1140 pounds.

10. For fastening to wood ceilings, beams, or joists, furnish Grinnell Fig. 128R, Grinnell Fig. 153, Tolco 78, or equal pipe hanger flange fastened with drive screws. Under wood floors, 3/8 inch hanger rods shall be hung from 2-inch by 2-inch by 1/4 inch angle clips 3 inches long, with 2, staggered 10d nails, clinched over joist.

11. Pipe hanger rod sizes: 3/8-inch for pipe sizes ½-inch through 4-inch, ½-inch for pipe sizes 5-inch through 8-inch, and 5/8-inch for pipe size 10-inch through 12-inch.

12. Where rod hangers are used with a diameter greater than 3/8-inch, they shall be equipped with swivels or eye nuts to prevent bending in the rod.

13. Turnbuckles, if furnished, shall provide a load carrying capacity equal to that of the pipe hanger with which they are being installed.

14. Pipe hangers shall be of same size, or nearest larger manufactured size available, as pipe or tubing on which they are being installed.

15. Hangers, clamps, and guides furnished for support of non-metallic pipe shall be padded with 1/8 inch thick rubber, neoprene, or soft resilient cloth.

16. Where special pipe-supporting requirements in the Specifications conflict with any standard requirements specified herein, the Specification requirements shall govern.

17. Vertical Piping:

    a. Vertical pipe risers shall be securely supported with riser clamps of recognized type. Risers in reinforced concrete buildings shall be furnished with extension clamps fastened to pipe above each concrete floor slab with extended arms of clamp to rest on slab. Clamps shall be provided with lead or Teflon liners when installed on copper tubing.

Clamps shall be plastic-coated when installed on non-ferrous pipe or tubing.

b. Copper tubing in sizes 1 ½-inches and larger and steel pipelines passing up through building shall be supported at each floor of building or every 15 feet whichever is less.

c. Copper tubing sizes 1 ¼-inches and smaller shall be supported at not intervals not more than 6 feet on center. Special provisions shall be installed for vertical lines subject to expansion and contraction caused by operating temperature differences.

d. Vertical cast iron pipelines shall be supported from each floor and at its base. Malleable iron or steel pipe clamps with minimum thickness of 1/4 inch shall be furnished and fastened around pipe for support.

18. Horizontal Piping:

a. Roof Mounted Piping: Pressure and non-pressure piping shall be supported from channels, stands, clamps, trapezes, rollers, or structures mounted on 100% rubber, UV resistant rooftop supports with reflective strips, Dura-Block, or equal. Roller type supports shall be provided below and above pipe to prevent its dislodgement. Bottom of pipes shall clear the roof surface by 10 inches.

b. Insulated steam and space heating hot water insulated condensate lines, insulated domestic hot water supply and return piping shall be supported with Tolco Figure 4, B-Line Figure B3140, Grinnell Figure 212, or equal, steel hangers with welded eye rods to permit hinge movement at point of attachment of hangers. Hinge movement at point of support shall be provided by welded eye linked rods Tolco Figure 101L, B-Line Figure B3211X, Grinnell Figure 278, or equal.

c. Domestic cold water piping, water supply and return piping, condenser water piping, insulated refrigerant piping gas piping, compressed air piping, cast iron soil piping, galvanized steel vents, waste and downspout piping and glass to be supported with Tolco Figure 1, B-Line Figure B3100, Grinnell Figure 260, or equal, hangers with rods, turnbuckles and inserts suitable for above hangers.

d. Maximum hanger and support spacing shall conform to CPC schedule for horizontal piping installed above grade.

19. A hanger or support shall be installed close to the point of change in direction of a pipe run, in either a horizontal or vertical plane.

20. When practicable, supports and hangers for cast iron soil pipe shall be installed as close as possible to joints and when hangers or supports are not located

within one foot of a branch line fitting, an additional hanger or support shall be installed at fitting.

21. In systems where grooved piping is used, couplings shall be provided with angle pattern bolt pads to comply with support and hanging requirements of ANSI/ASME B31.1, ANSI/ASME B31.9, and NFPA Pamphlet 13.

T. Flashings:

1. Each pipe, duct, or gas-fired equipment vent passing through roof shall be installed with waterproof flashing.

2. Flashing or flanges on pipes, vents, and ducts passing through a tile or slate roof shall be constructed of sheet lead. Flashing for pipes and heater vents passing through a roof shall be 4 pound soft sheet lead. Flashing and flanges for ducts and heater vents passing through exterior walls shall be 22 gage sheet metal. Install caps on top of heater pipes. Flanges and flashing shall be installed waterproof at point of connection with pipe or duct by welding. No soldered joints on roof flashings will be allowed. No Stoneman lead roof flashings will be allowed.

3. Lead flashing and flanges shall be constructed of 4 pound sheet lead with burned joints. Flange of lead flashing or lead flange on a duct shall extend out onto roof a minimum of 12 inches from pipe or duct. Lead flashing shall extend up the pipe or duct not less than 8 inches.

4. Sheet metal flashing shall be constructed of 24 gage galvanized sheet steel. Flanges on these flashings shall extend out onto roof a minimum of 10 inches from pipe or duct. Flanges on ducts through exterior walls shall extend out from duct a minimum of 2 ½ inches. Flanges on gas-fired equipment single-wall vents shall be of ventilated type. Type B gas vents through a roof shall be furnished with non-ventilated flashing as per NFPA Pamphlet 211.

5. Cast iron, steel, brass, and copper pipe, which terminates less than 18 inches above roof, shall be furnished with a combination counter-flashing and vandal-proof hood for protection against water, birds and foreign matter. Cast iron, steel, brass and copper pipe, which does not terminate within 18 inches of roof, shall be furnished with a counter-flashing sleeve. Pipe, which terminates more than 18 inches above roof, shall be furnished with protection against entrance of water, birds, and foreign matter.

6. Counter-flashing and combination counter-flashing sleeves and vandal-proof hoods shall be cast iron, vandal-proof, threaded, sealed or approved gas-heated sleeve type. Counter-flashing sleeves on each of these items shall extend down over flashing a minimum of ¾ inch.

7. Storm collars shall be securely screwed and installed waterproof around appliance vent pipe immediately above flashing.

8. Vent piping above roof shall be furnished with a combination counter-flashing sleeve and vandal-proof hood.

U. Equipment Installation: Install roof or floor mounted equipment on level platforms, housekeeping pads or curbs and provide sound, vibration and seismic control measures per Section 23 0548 even if not indicated on Drawings.

END OF SECTION

SECTION 22 0553

PLUMBING IDENTIFICATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Marking and identification on mechanical piping systems, ducts, controls, valves, and apparatus.

B. Related Requirements:

1. Division 01: General Requirements

3. Section 22 0513: Basic Plumbing Materials and Methods.

4. Section 22 1000: Plumbing.

5. Section 22 2013: Plumbing Piping.

1.02 SUBMITTALS

A. Submit in accordance with Division 01 and Section 22 0500: Common Work Results for Plumbing.

B. Submit product data and installation instructions for each item specified.

C. Submit Samples of materials.

1.03 QUALITY ASSURANCE

A. Comply with provisions of:

1. Section 22 0500: Common Work Results for Plumbing.

2. ANSI/ASME A13.1: Scheme for the Identification of Piping Systems.

3. APWA: Uniform Color Code.

4. IAPMO: Uniform Plumbing Code (UPC)

PART 2 – PRODUCTS

2.01 MATERIALS

A. General: Piping systems, controls, valves, apparatus, etc., except those that are installed in inaccessible locations in partitions, walls, and floors, shall be permanently identified.

2.02 VALVES

A. Furnish prepared chart or diagram for each piping system, indicating by identifying letter or model number of each valve in the system, its location, and function.

B. Install charts in aluminum frame with clear glass front and secure on wall where designated by the Project Inspector.

C. Bind copies of each chart in operating instructions manual.

D. Provide each valve with a brass, aluminum, or plastic disc, not less than 1-1/4 inches diameter bearing engraved numbers corresponding to those indicated on chart. Fasten discs to valve with No. 14 brass wire.

E. Provide an additional tag for safety valves and other valves that could be hazardous to safety and health of occupants. Distinguish these tags from regular valve tags by color (such as yellow with black letters and marked "Danger"); submit Sample tag to the Architect for review.

2.03 INSTRUMENTS AND CONTROLS

A. Identify panel-mounted instruments and controls with engraved bakelite nameplates permanently affixed to panel boards.

B. Identify alarm indicating devices and alarm reset devices by nameplates.

C. Identify automatic valves, flow switches, and pressure switches, with embossed aluminum or plastic tape affixed to controller, indicating service and setting.

2.04 EQUIPMENT

A. Identify each major piece of equipment with engraved bakelite nameplates permanently affixed to the equipment, indicating the room numbers it services, Equipment identification designation shall be the same to its designation indicated on the “As-Built Drawings”. Room numbers in the nameplates shall correspond to the final room numbers.

2.05 ABOVE GRADE PIPE IDENTIFICATION

A. Identify pipes by means of colored labels with directional flow arrows and identification of the pipe content, in conformance to ANSI/ASME A13.1 or the UPC.

B. Materials: Precoiled acrylic plastic with clear polyester coating, all-temperature, self-adhering, as manufactured by Brady, Brimar Industries, Seton, Stranco, Inc., or equal.

C. Size:

Outside Diameter of Pipe or Insulation (in inches)	Length of Color Field (in inches)	Size of Letter (in inches)
¾ to 1 ¼	8	½
1 ½ to 2	8	¾
2 ½ to 6	12	1 ¼
8 to 10	24	2 ½
over 10	32	3 ½

D. Locations:

1. On accessible piping, whether insulated or not (including mechanical rooms, attic and ceiling spaces); except that labels shall be omitted from piping where contained material is obvious due to its connection to fixtures (such as faucets, water closets, etcetera.).

2. Near each valve and branch connection in such accessible piping.

3. At each pipe passage through wall or floor.

4. At not more than 20 feet spacing on straight pipe run between bands required in 2 and 3 above.

5. At each change in direction.

E. Application: Install on clean surfaces free of dust, grease, oil, or any material that will prevent proper adhesion. Replace non-adhering or curling labels with new labels.

F. Color Schedule:

Content of Pipe	Legend	Background Color	Lettering Color
Domestic cold water	Domestic. C.W.	Green	White
Non-potable cold water	Caution: Non-potable Water Do Not Drink (1)(2)	Purple	Black
Domestic hot-water 140ºF	Domestic H.W. 140ºF	Blue	Black
Sanitary waste	San waste	Green	White
Sanitary vent	San vent	Green	White
Storm drain or	Storm drain	Green	White

downspout			
Indirect drain	Ind drain	Green	White
Sump pump discharge	Pump discharge	Green	White
Fire sprinkler supply	Fire Sprinkler supply	Red	White
Fire sprinkler drain	Sprinkler drain	Red	White
Fuel oil	Diesel oil	Yellow	Black
Gas	Gas	Yellow	White
Reclaimed Water	Caution: Reclaimed Water Do Not Drink (1)(3)	Purple	Black

H. Notes on Schedule:

1. Note (1) indicates 2 ¼ inch by 1 inch yellow label with ½ inch letters reading UNSAFE WATER at one end of primary label.

   Note (2) words should read "CAUTION: NONPOTABLE WATER DO NOT DRINK." with international *do not drink* symbol.

   Note (3) words should read "CAUTION: RECLAIMED WATER DO NOT DRINK." with international *do not drink* symbol.

2.06 UNDERGROUND PIPE

A. Detectable Marking Tape:

1. Provide and install detectable marking tape along buried piping. Tape shall be specifically manufactured for marking and locating underground utilities with electronic equipment. Tape shall be acid and alkali resistant, and manufactured with integral wires or foil backing, encased with protective cladding. Tape shall be a minimum of two inches in width.

2. Manufacturer: Reef Industries, Inc., Advantage Brands, Inc., Northtown Company, Mutual Industries, Inc., or equal.

3. Detectable marking tape shall be color-coded per APWA Color Code:

   a. Yellow: Oil and gas.

   b. Blue: Water, irrigation and slurry lines.

c. Green: Sewer and drain lines.

B. Tracer Wire:

1. Solid copper wire type THWN, 12 AWG gauge, with heat and moisture resistant insulation.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Correct detrimental conditions prior to commencing the Work of this Section. Install markers and identification tags as specified with materials and installation procedures recommended by manufacturer.

B. Place tracer wire on top of non-metal utility lines allowing some slack. Do not wrap tracer wire around pipe. Fasten tracer wire in place at approximately 10 feet on centers with non-metal ties.

C. Install underground detectable pipe marking tape continuously buried 8 to 10 inches above the buried utility pipe. Wrap tape on pipe risers up to a height of 12 inches above grade.

3.02 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 22 0700

PLUMBING INSULATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Insulation for plumbing piping.

B. Related Requirements:

1. Division 01: General Requirements.
2. Section 22 0500: Common Work Results for Plumbing.
3. Section 22 0513: Basic Plumbing Materials and Methods.
4. Section 22 0553: Plumbing Identification.
5. Section 22 1000: Plumbing.

1.02 REFERENCES

A. American Society for Testing and Materials International (ASTM):

1. ASTM C302 - Standard Test Method for Density and Dimensions of Preformed Pipe-Covering-Type Thermal Insulation.
2. ASTM C411 - Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
3. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
4. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
5. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
6. ASTM C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

8. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Underwriters Laboratories, Inc.

1. UL 723 - Test for Surface Burning Characteristics of Building Materials.

C. National Fire Protection Association:

1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

D. California Code of Regulation Title 24.

1. California Green Building Standards Code.

1.03 SUBMITTALS

A. Submit in accordance with Division 01 and Section 22 0500: Common Work Results for Plumbing.

1. Complete material list of items to be furnished and installed under this Section.

2. Manufacturer's specifications and other data required demonstrating compliance with the specified requirements.

3. Shop Drawings, catalog cuts and manufacturer's data indicating insulation, jacketing, adhesives, and coating. Insulating materials shall be certified by manufacturer to comply with the California quality standards for insulating materials.

4. Display sample cutaway sections.

5. Manufacturer's recommended method of installation procedures, which will become part of this Section.

1.04 QUALITY ASSURANCE

A. Qualifications of Manufacturer and Installer, Materials, Fabrication, Execution, and Standard of Quality: Comply with provisions stated under Section 22 0500: Common Work Results for Plumbing and Section 22 0513: Basic Plumbing Materials and Methods.

B. Insulation Work shall be in accordance with the California Building Energy Efficiency Standards, CBC, and Uniform Mechanical Code and the California Green Building Standards Code.

C. Test Ratings:

1. Comply with provisions stated under Section 22 0500 and 22 0513 with emphasis on ASTM E84, NFPA 255, or UL 723. ASTM C167, ASTM C302, UL label or listing of satisfactory test results from the National Institute of Standards and Technology, or a satisfactory certified test report from an acceptable testing laboratory. Approval by the State Fire Marshal is required.

2. Furnish labels, legibly printed with the name of the manufacturer or listings indicate that fire hazard ratings do not exceed those specified for materials proposed for installation. Flame spread index of not more than 25 and smoke developed rating not exceeding 50.

3. Tests shall be performed on each item individually when insulation, vapor barrier covering, wrapping materials, or adhesives are installed separately at the Project site.

4. Test insulation, vapor barrier covering, wrapping materials and adhesives as an assembly when they are factory composite systems.

D. Regulatory Requirements: Insulation furnished and installed under this Section shall meet minimum legal requirements of the Building Energy Efficiency Standards adopted and incorporated in the California Energy Commission, Title 24, Part 2, Chapters 2 through 53 and the California Green Building Standards Code unless otherwise noted, for the piping,

E. Chemically based products such as sealers, primers, fillers, adhesives, etcetera must meet the California air quality regulations.

1.05 PRODUCT HANDLING

A. Protection, Replacement, Delivery and Storage: Comply with provisions stated under Sections 22 0500: Common Work Results for Plumbing and 22 0513: Basic Plumbing Materials and Methods.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General:

1. Insulating material shall be fire resistant, non-corrosive, shall not break, settle, sag, pack or disintegrate under vibration, nor absorb more than 1 percent moisture by weight.

2. Insulating material shall be furnished with thickness indicated in Table 1, and shall furnish thermal resistance in the range of R-4.0 to 4.6 in accordance with inch at 75 degrees F. For any other value of R, insulation thickness shall be calculated accordingly and submitted for review.

3. Asbestos in any quantity in insulating material is not permitted.

4. Provide insulation materials, adhesives, coatings, sealants, fitting covers, and other accessories with a fire hazard rating not to exceed 25 for flame spread, 25 for fuel contributed and 50 for smoke developed, except for materials listed as follows:

   a. Nylon anchors for installing insulation to equipment.

   b. Treated wood blocks.

5. Flame-proofing treatments subject to moisture damage are not permitted.

TABLE 1 - MINIMUM PIPING INSULATION THICKNESS (1)

Insulation Thickness Required (in inches)

Piping System Type	Temp. Range (degrees F)	Runouts up to 2 (2)	1 and less	1.25 to 2	2.5 to 4	5 to 6	8 and larger
Service Water Heating Systems (recirculating, piping supply and return)							
Hot Water	Up to 180	0.5	1.0	1.0	1.5	1.5	1.5
Condensate Drain	½ inch minimum insulation thickness.	0.5	0.5	0.5	0.5	0.5	0.5
From A/C Equipment:	Insulate condensate drain lines within building, in room, inside walls and above ceilings.	0.5	0.5	0.5	0.5	0.5	0.5

NOTES: (1) For piping exposed to ambient temperatures, increase thickness by 0.5 inch.

(2) Runouts to individual terminal units, not exceeding 12 feet in length.

B. Lagging Adhesives: Shall be nonflammable and fire-resistant and shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Insulation finished with canvas shall be provided with laps adhered in accordance to manufacturer's recommendation. A finish coat of same material shall be applied to entire outer surface of lagging cloth at coverage specified by manufacturer.

C. Canvas Jackets: Provide 6 ounce, in accordance with square foot minimum, 48 by 48 thread count canvas jacketing.

D. Insulation Jackets:

1. Exterior insulation exposed to weather shall be weatherproofed with Childers aluminum jacketing as basis of design, or Pabco, RPR, or equal. Jacketing shall be manufactured from 1100, 3105 or 5010 aluminum alloy with 3/16 inch corrugations. Smooth or embossed jackets may be permitted in special situations to match an existing installation. Jacketing shall be furnished with an integrally bonded moisture barrier over entire surface in contact with insulation. A minimum thickness of 0.016 aluminum jacketing is to be provided on ducts and piping. A minimum thickness of 0.020 shall be provided on tanks, equipment, and heat exchangers.

2. Insulated elbows, of 90 degrees and 45 degrees, with a nominal iron pipe size of ½ inch to 8-inch shall be provided with Childers aluminum Ell-Jacs insulation covers as basis of design, or Pabco, RPR, or equal, manufactured from 1100 aluminum alloy of 0.024 inch thickness. Insulated elbows with a nominal pipe size of 10-inch to 18-inch shall be provided with Childers 4-piece aluminum Ell-Jacs as basis of design, or Pabco, RPR, or equal.

3. Tees, Flanges, and Valve Insulation in Conjunction with Aluminum Jacketing: Furnish Childers Aluminum Special Fabrications Insulation Covers as manufactured by Childers Products Company, Pabco, RPR, or equal.

E. Adhesives: Adhesives shall be water based, UL Classified, meet the requirements of NFPA 90A and NFPA 90B, have been tested according to relevant ASTM requirements, and be acceptable to the State Fire Marshal. Name, type and method of installation shall be submitted for review.

F. Valve and Fitting Cover: When installed in conjunction with PVC jacketing, furnish Zeston 25/50 rated polyvinyl chloride fitting covers as manufactured by Johns Manville, Knauf Insulation, Speedline, or equal.

2.02 DOMESTIC HOT WATER PIPING SYSTEM INSULATION

A. General: Insulate domestic hot water supply and return piping, including valves, strainers and fittings with insulation thickness as indicated on Table 1.

B. Materials:

1. Classes of Insulation:

a. Class A: Glass fiber molded pipe insulation suitable for service temperatures up to 850 degrees F. Pipe insulation shall be one piece, preformed, and provide a minimum R factor of 4.0 at 75 degrees F mean temperature. Insulation shall be faced with all-purpose fire retardant vapor barrier jacket. Pipe insulation shall be Johns Manville Micro-Lok, Knauf Redi-Klad 1000, Owens Corning FIBERGLAS Pipe Insulation SSL II-ASJ, or equal.

b. Class B: Flexible open-cell melamine (foam insulation) suitable for service temperature -150 degrees F to 400 degrees F. Thermal conductivity at 75 degrees F, K= 0.26. Pipe insulation, one-piece pre-formed, laminated to heavy non-reinforced PVC jacket, with locking track, factory installed to jacket, to snap insulation and jacket onto pipe. Similar to TechLite 079 Series as manufactured by Accessible Products Co., or equal. Installation shall comply with manufacturers recommendations.

c. Class C: Mineral fiber pipe insulation suitable for service temperatures up to 1200 degrees F. Pipe insulation shall be one-piece, preformed up to 3 inches thick, and provide a minimum R factor of 4.0 at 75 degrees F mean temperature. Insulation shall be faced with all-purpose fire-retardant vapor barrier jacket. Pipe insulation shall be 8 pounds in accordance with cubic foot density by Roxul Techton 1200, Fibrex COREPLUS 1200, Industrial Insulation Group, LLC (IIG) MinWool-1200, or equal.

2. Locations and Class of Insulation Required:

TABLE 2 – LOCATIONS AND CLASS OF INSULATION REQUIRED

LOCATION	CLASS OF INSULATION
Equipment Room	A, B or C
Other Locations	A, B or C

3. Fittings on indoor piping shall be covered with flush, hand-wrapped Class A, B, or C insulation, to match the adjoining pipe insulation and covered with polyvinyl chloride fitting covers: Zeston 2000 25/50 by Johns Manville, Knauf Insulation Proto PVC Fitting Cover, Speedline Polyco Smoke Safe, or equal.

4. Adhesive: Fibrous Adhesive to bond calcium silicate to itself and non-porous surfaces.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Except as specified herein, install material in accordance with recommendations of manufacturer. Do not install insulation materials until tests specified in other sections are completed. Remove foreign material such as rust, scale, or dirt. Surfaces shall be clean and dry. Maintain insulation clean and dry at all times.

B. On cold surfaces where a vapor barrier must be provided and maintained, insulation shall be installed with a continuous, unbroken moisture and vapor seal. Hangers,

supports, anchors, or other projections that are fastened to cold surfaces shall be insulated and vapor sealed to prevent condensation.

C. Surface finishes shall be extended in such a manner as to protect raw edges, ends, and surfaces of insulation.

D. Pipe or duct insulation shall be continuous through walls, ceiling or floor openings, or sleeves; except where firestop or firesafing materials are required.

E. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Inserts shall be of equal thickness to adjacent insulation and shall be vapor sealed accordingly.

F. Insulation shall not be installed in the following locations unless otherwise noted:

1. On unions, flanged connections or valve handles.

2 Over edges of any manhole, clean-out hole, clean-out plug, and to restrict opening or identification of access.

3. Over any label or stamp indicating make, approval, rating, inspection, or similar data, unless provision is made for identification and access to label or stamp.

3.02 INSTALLATION OF DOMESTIC HOT WATER PIPING SYSTEM INSULATION

A. General: Domestic hot water, tempered water supply and return piping and condensate return piping, after having been tested, shall be cleaned and insulated.

B. Application: Insulate condensate return piping, domestic hot water supply and return, including tempered supply and return piping in accordance with manufacturer's instructions and as specified herein.

1. Install insulation on valve bodies up to valve bonnet. Fill void in saddles, in accordance with Section 22 0513: Basic Plumbing Materials and Methods, with insulation and seal joints.

2. Install insulating material to fittings, valves, and strainers and smooth to thickness of adjacent covering. Leave strainer clean-out plugs accessible. Covers fabricated from polyvinyl chloride shall be furnished.

C. Insulation Jackets in Exposed Indoor Locations:

1. Cover completed insulation with canvas jacket tightly pasted to covering with lagging adhesive. Lap jacket seams 1 1/2-inch minimum. Finish entire jacket with coating of undiluted adhesive.

2. Equivalent factory applied pre-sized, glass fiber reinforced, or glass fiber jackets may be furnished. Seal jacket seams with adhesive in accordance with manufacturer's instructions.

3. Johns Manville Zeston 2000, Knauf Insulation Proto PVC Fitting Cover, Speedline Polyco Smoke Safe, or equal, fitting covers may be furnished, with molded or segmented insulation equal to specified insulation applied to fittings. Secure covers in accordance with manufacturer's instructions.

4. In addition to above requirements, cover exposed insulated piping within a distance of 8 feet above floors with 26 gage galvanized steel jacket. Omit jacket in areas accessible only to maintenance personnel, such as mechanical equipment rooms, utility corridors, accessible pipe tunnels and manholes.

D. Concealed Indoor Locations: Cover insulation over fittings, valves, and strainers with canvas. Provide pipe insulation with factory or field applied standard jacket of 4 ounce minimum canvas, fiberglass cloth, or glass fiber reinforced jacket. Seal jacket laps with adhesive in accordance with manufacturer's instructions.

E. Exposed Outdoors: In addition to canvas or fiberglass cloth cover, pipe insulation exposed to weather shall be provided with an additional 0.016 inches thick aluminum jacket with 2-inch lap connected with one inch hem overlap joint located on side of pipe and turned down to shed water. Jacket shall be strapped 12 inches on center with ½-inch wide stainless steel strapping and wing seals. Aluminum jacket shall be mitered to fit fittings.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.04 PROTECTION

A. Protect the Work of this Section until Substantial Completion.

END OF SECTION

SECTION 22 1000

PLUMBING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Labor, materials, tools, and equipment to install plumbing systems as indicated.

B. Related Sections:

1. Division 01 - General Requirements.
2. Section 07 9200: Joint Sealants.
3. Section 10 4413: Fire Extinguishers and Cabinets.
4. Section 22 0500: Common Work Results for Plumbing.
5. Section 22 0513: Basic Plumbing Materials and Methods.
6. Section 22 0553: Identification for Plumbing piping and Equipment.
7. Section 22 0700: Plumbing Insulation.

1.02 SUBMITTALS

A. Provide in accordance with Division 01 and Section 22 0500: Common Work Results for Plumbing.

B. Provide necessary documentation to Owner for processing rebates for water efficient fixtures.

1.03 QUALITY ASSURANCE

A. Unless otherwise noted, the California Plumbing Code is hereby made part of this section.

B. Conform to provisions of Section 22 0500: Common Work Results for Plumbing.

C. Manufacturers of plumbing products must be third-party certified to ANSI/NSF Standard 61-2020, Section 9, and ANSI/NSF 372, to demonstrate compliance with the California Health and Safety Code Section 116875 and 116876, and the federal

requirements for lead contribution to drinking water, the Safe Drinking Water Act SDWA.

1.04 PRODUCT HANDLING

A. Conform to provisions of Section 22 0513: Basic Plumbing Materials and Methods.

PART 2 - PRODUCTS

2.01 PIPING SYSTEMS

A. Materials: Refer to Section 22 0513: Basic Plumbing Materials and Methods.

B. Insulation for Piping: Refer to Section 23 0700: Plumbing Insulation.

2.02 FIXTURES AND DRAINS

A. General: Fixtures specified shall be furnished complete with trim and fittings. Cast iron plumbing fixtures shall be acid resistant enamel and identified by casting letters "AR" or words "acid-resistant" into metal. Fixtures shall be white unless otherwise specified. Cast iron fixtures shall be white enamel inside and on back, rim and apron, with exposed unfinished surfaces painted white. Fixtures of same general classifications shall be of same make.

B. Finished Brass:

1. Unless otherwise specified, finished brass of a similar type shall be of same manufacturer and model throughout buildings.

2. Finished and exposed brass plumbing, except floor, shower and urinal drains shall be chromium-plated and polished. Floor, shower and urinal drains, unless otherwise specified, shall be nickel-bronze metal.

C. Traps, Trap Arms and Tailpieces:

1. Fixture Traps shall be all L.A. Code Cast Brass Chromium-plated and polished. Exceptions as follows:

a. Traps that are an integral part of a fixture.

b. Traps concealed in floors, walls and furring.

c. Traps standard for service sinks and Industrial Shop equipment.

d. Laboratory traps and tailpieces shall be as specified in section 22-0513 “Basic Plumbing Materials and Methods”.

2. Trap Arms shall be all IPS Threaded Brass Nipples into Female IPS Threaded Drainage Tee.

3. Tailpieces, Extension Tailpieces, 2-part wastes and any other tubular products shall be minimum 17 gage polished chromium-plated brass, except as otherwise specified.

4. Furnish polished chromium-plated brass wall flanges with setscrews and polished chromium-plated brass cover casing on discharge side of each trap.

D. Faucet and Shower Valve Handles: Faucet and shower valve handles shall be solid brass, chromium-plated and polished, and fastened to their stems by Allen type hollow head stainless steel set screws through the side of the handle extending into the stem. Handles with sharp edges or projections shall not be furnished. At accessible fixtures: handles shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate handles shall be 5 pounds maximum.

E. Fixture Supplies:

1. Supplies for water heaters shall be unplated rigid copper water tube with threaded adaptors for connections to valves and other threaded connections. All other supplies shall be chromium-plated brass with hospital threads or shall be furnished with fittings and valves, which completely cover threads.

2. Exposed supplies for showers shall be chromium-plated brass pipe up to header with hospital threads or shall be furnished with fittings and valves, which completely cover threads.

3. Supplies to water closet tanks, lavatories, and drinking fountains shall be furnished with a NSF 372/61 threaded brass nipple. Exposed unfinished piping shall be sleeved with chrome plated brass or copper cover casing and have an appropriate escutcheon for a clean finished appearance. Angle/straight valve stops shall be female 1/2 IPS (inlet) by 3/8 compression (outlet). Fixture supplies shall be polished chrome-plated, solid supply bulbed end risers with size compatible supply nut connection to fixture and 3/8 O.D. compression nut and ferrule connection to angle stop outlet. Stainless steel flexible braided connectors with re-enforced PVC inner hose are not allowed.

4. Hot and cold water fitting supply outlet piping serving water closets, urinals, lavatories, drinking fountains, sinks, faucets, hose bibs, and sillcocks shall be iron pipe size (IPS) brass nipple, and piped in such a manner that through wall water supply outlet piping be removable, size appropriate, and lead free. The use of copper, copper MIP sweat adapters or similar fittings, in lieu of brass nipples is not allowed. The IPS brass nipple shall be directly connected to the fixture as follows:

a. Control stops for water closet and urinal flush valves.

b. Angle stop for lavatories, sinks and drinking fountains.

c. Shank/arm adapters for wall mounted sink faucets.

d. Iron pipe size (IPS) brass nipple connection for hose bibs, sillcocks, and other plumbing related fixture and/or plumbing fitting water supply outlets.

5. Water supply pipe that penetrates a finished surface, wall, countertop or part of a cabinet shall be appropriately sized polished chromium-plated cover casing and wall flange/escutcheon fitting tight to the brass through wall nipple and securely affixed to the finished wall surface.

6. Water supplies of plumbing fixtures shall be protected against back-siphonage in event of a vacuum in piping system. Toilet and urinal flush valves shall be furnished with recognized atmospheric vacuum breakers, installed a minimum of 6 inches above fixture.

7. Discharge outlets of supply faucets for lavatories and sinks shall clear top of overflow rim by at least one inch.

2.03 ACCESS PLATES (To cleanouts, valves, water hammer arrestors and hose faucets)

A. Provide minimum 12" by 12" Access Plates for installation of recessed valves.

B. Cleanouts shall be installed by using cleanout plug, set flush to finished wall plane.

1. Installation of any cleanout plug within an access panel is not allowed. Exception: Custodial Sink, refer to the related standard technical drawing.

C. Schedule Numbers:

AP-1: Square, unless otherwise noted, steel, prime coated; frame, 18 gage minimum. Door shall be 16 gage minimum with concealed hinge or be removable, with vandal-proof lock operated by Allen wrench. **(Specify for painted and stucco walls.)**

SMITH	ZURN	ELMDOR	MILKOR	WATTS	MIFAB	JOSAM
Fig 4760 AK	Z-1462-VP	DW-AKL	MOR DW AK1	CO-300-S-6	UA-A	58650-VP OR EQUAL

AP-2: Round type, stainless steel, vandal-proof, 5/16 inch No. 18 or 1/4 inch No. 20 flat-head machine screw into cleanout plug. Plate shall be prime coated minimum 18 gage steel or polished chrome-plated brass, 18-8 No. 302 stainless steel, or polished nickel bronze.
(To be specified for painted walls, screwed into cleanout plug.)

SMITH	ZURN	JOSAM	WADE	WATTS	MIFAB	OR EQUAL
4710U	Z-1469-VP	58600	8480R	CO-480-RD-6	C1400-RD-6	

AP-3: Square, polished face chrome-plated bronze, aluminum alloy or brass chrome-plated brass frame with 14 gage polished 18-8 No. 302 stainless steel or brass chrome-plated secured cover with vandal-proof screws.
(To be specified for tile walls.)

SMITH	ZURN	WADE	WATTS	MIFAB	JOSAM	OR EQUAL
4735U	Z-1460-VP	58630	CO-300-S-6	C1400-S-3-6	58640-VP	

AP-4: Square, floor type, cast nickel-bronze aluminum alloy or brass, with Carborundum or Scoriated, secured top.

(To be specified for floor access to solid interceptor in Science Room, Ceramic Room, and Agriculture Room.)

SMITH	ZURN	JOSAM	WATTS	MIFAB	OR EQUAL
4910U	Z-1461-VP	58630	CO-300-S-6	C1300-S-6	

2.04 BACKFLOW PREVENTION ASSEMBLIES

A. Schedule Numbers:

BPV-1: Pressure vacuum breakers ½ inch to 2 inches, Los Angeles City approved.

(To be specified for irrigation lines to protect the potable water systems)

WILKINS	WATTS	FEBCO	OR EQUAL
720A	800M4QT	765	

BPV-2: Non-pressure type, atmospheric vacuum breaker, Los Angeles City approved. **(To be specified for "Point-of-Use" conditions.)**

WATTS	WILKINS	OR EQUAL
LF288A	35XL	

BPV-3: Reduced pressure or pressure differential type, Los Angeles City approved and in compliance with DWP Rule 16-D for meter protection. Sizes ½ inch to 6-inch.

(To be specified where potential health hazard exists and at main meter. Group component devices into a dual (parallel) configuration to avoid service interruptions during testing and servicing of devices. Devices shall be designed and installed in an above ground compact, low profile and serviceable valve station)

WILKINS	WATTS	FEBCO	OR EQUAL
375 and 975 XL (for uninterrupted service)	LF009-QT; LF909-NRS	LF860	

BPV-4: Double check valve assembly for water protection. Sizes 2 ½-inch to 6-inch.

(Specify with non-toxic systems or where no potential health hazards exists. Devices shall be designed and installed in an above ground compact, low profile and serviceable valve station)

FEBCO	WILKINS	WATTS	OR EQUAL
LF870V	350	LF709	

BPV-5: Double check valve assembly. Sizes ¾ inch to 2-inch.

(To be specified with non-toxic systems or where no potential health hazard exists.)

WILKINS	WATTS	FEBCO	OR EQUAL
950XL	LF007	LF850	

BPV-6: Pressure vacuum breakers with 3/4 inch hose bib. Install 6 feet above finished floor.

WILKINS	WATTS	FEBCO	OR EQUAL
420XL	LF008PCQT	LF765	

2.05 BACKWATER SEWER VALVE ASSEMBLY

A. Schedule Numbers:

BSV-1: Cast iron with access cover, Los Angeles City approved type, with line size gate valve upstream and downstream.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
7022-S	Z-1090	BV-200	BV-1000	67500	

2.06 CLEANOUT ASSEMBLIES

A. Cleanout plug shall be line size.

B. Schedule Numbers:

CO-1: Iron body cleanout tee full line size up to 4 inches and round access plate, plugs shall be brass, countersunk with tapped boss for 5/16 inch No. 18 or ¼ inch No. 20 screws. **(Specify for finished walls at base of waste stack, above urinal and service sink.)** AB&I and TYLER may be used as iron body cleanouts. Trim and accessories shall be Smith or Zurn or equal.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
4532-U	Z-1446-BP	CO-460-RD-34B	C1460-RD-6	58600-CO	

CO-2: Iron body with approved UPC plug, top and adjustable sleeve, cut-off ferrule, polished scoriated brass nickel bronze secured cover. AB&I and TYLER may be used as iron body cleanouts. Trim and accessories shall be Smith or Zurn or equal **(To be specified for finished floors inside buildings, in covered areas, and in concrete paving.)**

Square:

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
4053L-U-NB	ZN-1400-T	CO-200-S	C1220-S-1-6	55000-1-SQ	

Round:

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
4033-L-U-NB	ZN-1400	CO-200-R	C1220-1-6	55000-1	

CO-3: Secured cover, extra heavy-duty, adjustable sleeve, cut-off ferule, UPC. Brass approved type plug, scoriated tractor type cover.

(To be specified for areas outside building on concrete paving.)

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
4233-U	ZN-1400-HD	CO-200-RX-4	C1220-4-6	55000-22	

CO-4: Tapped soil tee with brass plug, full line size.

(Specify for above grade, outside building at base of exposed downspout.)

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
4512	Z-1445-BP	CO-460-34A	C1460	58910	

CO-5: Raised threaded head brass plug.

(To be specified for yard box YB-3.)

ZURN	WATTS	SMITH	JOSAM	OR EQUAL
Z-1470-A	CO-590	4285	58540-20	

2.07 CIRCULATING PUMPS, HOT WATER HEATING SYSTEM

A. Schedule Numbers:

CPH-1: Centrifugal, single stage, close coupled with adjustable cast iron base, bronze enclosed impeller, lead-free mechanical shaft seal suitable for water temperature range from 20 degrees to 300 degrees F. Screwed or flanged connections. GPM and TDH capacities as indicated.

BELL & GOSSETT	WEIMAN	PACIFIC	TACO	OR EQUAL

CPH-2: In-line mounted. Close coupled, centrifugal type with an all bronze water chamber, bronze sleeve bearings, bronze impellers, water tight shaft seal suitable for water temperature range from 20-300 degrees F. Forged steel shaft. It must be provided with bracket support to damper vibrations. GPM and TDH capacities as indicated.

BELL & GOSSETT All Bronze	GRUNDFOS	TACO	OR EQUAL

2.08 DRINKING FOUNTAINS

A. Also see Electric Water Coolers, below.

B. Drinking Fountains shall be provided with brass free waterways and provisions for future installation of water filter as required.

C. Schedule Numbers:

DFWF-1: In-line 3/8" inlet/outlet Head Assembly and Bypass Plug to be installed within a recessed access panel per LAUSD Standard Technical Drawings for future installation of drinking fountain cartridge DFWF-1a.

MANUFACTURER	PART NUMBER	
AQUA PURE/3M	6213063 3M ID Number: 70-0203-5155-0	OR EQUAL

DFWF-1a: In-line Cartridge for drinking fountains, with ANSI/NSF 61, ANSI/NSF 372, CSA-B483.1-07, and ANSI/NSF 53 listed 1/4 Turn 2.5 gpm 6,000-gallon rated Cartridge with 0.5 Micron sediment/Carbon pre-filter.

FILTER	MODEL	
3M/AQUA PURE	3MFF101	OR EQUAL

DFWF-2: In-line head and Cartridge assembly, for single bubbler drinking fountains components, with ANSI/NSF 61, ANSI/NSF 372, CSA-B483.1-07, and ANSI/NSF 53 listed 1/4 Turn Cartridge with 0.5 Micron sediment/Carbon pre-filter.

FILTER	MODEL	
3M/CUNO	FM DWS 1500	OR EQUAL

DF-1: Multiple bubblers, wall mounted cast iron with white porcelain enamel finish with two integral basin shank vandal resistant bubbler heads, with brass free waterways. Brass free flow/pressure regulating valves with flow-adjustable push buttons. Include chrome-plated cast brass grid waste strainer with integral keyed locking lugs for vandal resistance. A stainless steel screen water supply strainer, mounting brackets and vandal-resistant bottom plate shall be furnished. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(For indoor or outdoor use. at Kindergarten, Middle School and High School, where access compliance is not required.)**

HAWS		OR EQUAL
1430		

DF-2: Multiple bubbler, access compliant wall-mounted cast iron with white porcelain enamel finish, with two integral basin shank vandal-resistant bubbler heads, with brass free flow/pressure regulating valves and flow-adjustable push button activation. Chrome-plated cast brass grid waste strainer with integral keyed locking lugs for vandal resistance. A stainless-steel screen water supply strainer, mounting brackets, and vandal-resistant bottom plate shall be furnished. Install with 1/4-inch-thick steel mounting plate inside the wall. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(For indoor or outdoor use. at Kindergarten, Middle School and High School)**

HAWS		OR EQUAL
1431		

DF-3: Multiple Bubblers, wall-mounted, white enameled cast iron drinking fountain, with three integral basin shank vandal-resistant bubbler heads, with brass free flow/pressure regulating valves, push button activation, chrome-plated cast brass grid waste strainer with integral keyed locking lugs for vandal resistance. A stainless-steel screen water supply strainer, mounting brackets, and vandal-resistant bottom plate shall be furnished. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(To be specified for outdoor use located on High School Sanitary unit at Athletic Field.) Where access compliance is not required.**

HAWS	OR EQUAL
1435	

DF-4: Single Bubbler, access compliant wall-mounted, recessed, 18 gage Type 304 stainless steel drinking fountain with satin finish, furnished with a single integral basin shank vandal-resistant bubbler head, with brass free flow/pressure regulating valve, push button activation, vandal-resistant chrome-plated solid brass flat waste strainer, and a stainless steel screen water supply strainer at the inlet. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(To be specified for indoor use, access compliant, requires frontal approach provision).**

OASIS	MURDOCK	HALSEY TAYLOR	OR EQUAL
F240PM	A181400S	BFM L/R	

DF-5: Single bubbler, access compliant, recessed alcove wall-mounted drinking fountain with matching cuspidor combination, dual 18 gage Type 304 stainless steel receptors with satin finish, furnished with a single integral shank vandal-resistant bubbler head in the fountain, with brass free flow/pressure regulating valve, push button activation, a stainless screen water supply strainer at the inlet, a chrome-plated cast brass water spreader in the cuspidor, and chrome-plated solid brass flat waste strainers in both. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(To be specified for indoor use in Physical Education and Gymnasium locations, access compliant use DF-4 in Exercise Gymnasium. For use in High School Gymnasium Building and Middle School Physical Education Building, delete use of cuspidor in Exercise Gym. Limit the installation of cuspidor to the replacement projects only. Requires frontal approach provision.)**

MURDOCK	HALSEY TAYLOR	OR EQUAL
A181400S-CUSP	8880 W/10245 CUSPIDOR	

DF-6: Single bubbler, recessed alcove wall-mounted drinking fountain furnished with matching cuspidor combination, dual 18 gage Type 304 stainless steel receptors with satin finish, furnished with a single integral shank vandal-resistant bubbler head in the fountain, with brass free flow/pressure regulating valve, push button activation, stainless steel screen water supply strainer at the inlet, a chrome-plated cast brass water spreader in the cuspidor, and chrome-plated solid brass flat waste strainers in both. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(To be specified for indoor use in Physical Education and Gymnasium locations for Non-ADA installation. Limit the installation of cuspidor to the replacement projects only.)**

OASIS	MURDOCK	OR EQUAL
FLF231PM	A181400S	

DF-7: Dual Height - Two unit, access compliant, wall-mounted, 14 gage Type 304 stainless steel dual height (high, low) drinking fountains, each of one-piece construction, with 1/4 inch thick stainless steel backs, furnished with two (one each unit) integral basin shank, vandal-resistant bubbler heads, with brass free flow/pressure regulating valves with flow adjustable push button activation, chrome-plated cast brass waste strainers, and with bottom plates, and with stainless steel screen water supply strainers at inlet. Install with a 3/16-inch-thick steel mounting plate inside the wall. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(To be specified for indoor, fully access compliant, or shaded outdoor locations subject to severe vandalism.)**

HAWS	MURDOCK	HALSEY	OR

		TAYLOR	EQUAL
1117LN with mounting plate 6700.4; 1119.14 with mounting plate 6700.4	A152400S-FG-W32	HDFF-EBP	

DF-7A: Dual height – Two-unit, access compliant wall-mounted barrier free polymarble drinking fountain. "Hi-Lo" white polymarble barrier free drinking fountain that includes polished chrome-plated bubbler heads, recessed push button valves, vandal resistant bottom plates, integral mounting brackets, special in-the-wall mounting plate, and 1-1/2" NPT traps. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(This unit to be specified for outdoor use where heat resistance is necessary.)**

HAWS	MURDOCK	HALSEY TAYLOR	OR EQUAL
1501 with plate 6715	A152J00S	HRFG-SEBP-VR	

DF-7B: Single bubbler, access compliant, wall mounted, 14 gage Type 304 stainless steel drinking fountain of one piece construction with 1/4 inch thick stainless steel back. Furnished with integral basin shank vandal resistant bubbler heads, with brass free flow/pressure regulating valve with flow-adjustable push button activation, chrome plated cast brass waste strainer, with bottom plate, and stainless screen water supply strainer. Complete drinking fountain with trim and brass free fittings must be certified to ANSI/NSF 61, and ANSI/NSF 372 lead free. **(To be specified for indoor, or shaded outdoor locations subject to severe vandalism.)**

HAWS	MURDOCK	HALSEY TAYLOR	OR EQUAL
1107L or 1107L-BP7 1109.14 Mounting Plate: 6700.4	A151400S-FG	HDFF-EBP	

DF-8: Single bubbler, access compliant white porcelain enamel cast iron wall-mounted drinking fountain. Furnish with brass free waterways, integral basin shank vandal-resistant bubbler head, cast brass waste strainers, with stream adjustable push button operation pressure regulating valves. Bottom cover plates, low profile 1-1/4 inch cast brass trap, stainless steel screen water supply strainer. Access compliant; and certified to ANSI/NSF 61 and ANSI/NSF 372 lead free. Furnish a 3/16 inch thick steel mounting plate No. 6700, which can also be installed with model No. 6800 concealed carrier steel struts for additional support where wall-mounted fountain may be subjected to excessive leverage **(To be specified for indoor or outdoor general use.)**

HAWS	MURDOCK	HALSEY TAYLOR	OR EQUAL
1311 Mounting Plate 6700	A151J00S	HRFG-E	

DF-8A: Dual height, access compliant white porcelain enamel cast iron wall-mounted drinking fountains; furnish with brass free waterways, integral basin shank vandal-resistant bubbler heads, cast brass waste strainers, stream adjustable push button operation pressure regulating valves. Bottom cover plates, low profile 1-1/4 inch cast

brass traps, and stainless steel screen water supply strainer. Access compliant and certified to ANSI/NSF 61 and ANSI/NSF 372 lead free. Furnish a 3/16 inch thick steel mounting plate number 6715, which can also be installed with model No. 6800 concealed carrier steel struts for additional support where wall-mounted fountain may be subjected to excessive leverage. **(To be specified for indoor or outdoor general use.)**

HAWS	MURDOCK	HALSEY TAYLOR	OR EQUAL
1501 Mounting Plate # 6715	A152J00S	HRFG-SEBP-VR	

DF-9: Hi-Low pedestal, access compliant drinking fountains, one wheelchair accessible and one standing person drinking fountain bowls, with an ADA accessible Bottle Filling station, free-standing heavy duty all stainless steel pedestal with silver solar reflective powder-coated finish, chrome plated brass push-button operated stainless steel valves with front access to service the water control cartridge and integral water supply strainer, and front accessible flow adjustment, with polished chrome-plated solid brass drinking fountain bubbler heads with laminar .45 gpm flow to prevent splashing and integral 5/8" dia. basin shank for vandal resistance strength, 100% lead-free waterways, with polished chrome-plated vandal-resistant waste strainers, vandal-resistant access plates, with integral mounting base, and internal space for CONTRACTOR supplied DFWF-1 drinking water filter Head Assembly with Bypass Plug, The CONTRACTOR shall request a "filter ready" installation detail from the manufacturer. 1-1/2" waste. ADA & CBC accessible, CSA Certified NSF/ANSI 61 Section 9, and NSF/ANSI 372. Basis of Design: Haws model 3612-1200 **(To be specified for secondary schools and higher outdoor use in remote locations ONLY.)**

HAWS	OR EQUAL
3612-1200	

DF-9A: Hi-Low-Low pedestal, access compliant drinking fountains, one standing person with one wheelchair accessible and one child-height drinking fountain bowls, free-standing heavy duty all stainless steel pedestal with silver solar reflective powder-coated finish, chrome plated brass push-button operated stainless steel valves with front access to service the water control cartridge and integral water supply strainer, and front accessible flow adjustment, with polished chrome-plated solid brass drinking fountain bubbler heads with laminar .45 gpm flow to prevent splashing and integral 5/8" dia. basin shank for vandal resistance strength, 100% lead-free waterways, with polished chrome-plated vandal-resistant waste strainers, vandal-resistant access plates, with integral mounting base, and internal space for CONTRACTOR supplied DFWF-1 drinking water filter Head Assembly with Bypass Plug. The CONTRACTOR shall request a "filter ready" installation detail from the manufacturer. ADA & CBC accessible, CSA Certified NSF/ANSI 61 Section 9, and NSF/ANSI 372. Basis of Design: Haws model 3603-1200 **(To be specified for Elementary schools' outdoor use in remote locations ONLY.)**

HAWS	OR EQUAL
3603-1200	

DF-10: Stand-alone bottle filler; shall be constructed of all 14 gauge type 304 stainless steel and no plastic shall be used in its construction allowing easy cleaning for maintenance. A laminar flow of water shall be activated with a front mounted and ADA accessible push button and be within ADA reach guidelines when properly installed. All waterways shall be brass free and unit shall be certified to ANSI/NSF 61 and ANSI/NSF 372 lead free. Fixture shall meet ADA, ADA Standing Person or ADA Child requirements when mounted appropriately. No electricity shall be needed to operate the unit. For bubbler stream activation, a non-proprietary, adjustable flow push button activated cartridge shall be used. **(To be specified for indoor, or shaded outdoor locations subject to severe vandalism.)**

Murdock	OR EQUAL
BF3 Semi-Recessed Installation	

DF-11: Single bubbler, wall mounted one piece stainless steel drinking fountain, with bottle filler constructed of all 14 gauge type 304 stainless steel and no plastic shall be used in its construction for vandal resistance. A laminar flow of water shall be activated with a front mounted and ADA accessible push button and be within ADA reach guidelines when properly installed. Any excess water draining into the fountain basin shall utilize a single common drain for both fountain and bottle filler. All waterways shall be brass free and unit shall be certified to ANSI/NSF 61 and ANSI/NSF 372 lead free. No electricity shall be needed to operate the unit. For bubbler stream activation, a non-proprietary, adjustable flow push button activated cartridge shall be used. With bottle stand number "BottleStand1107" shall be attached to the drinking fountain bowl directly below the Bottle Filler, as needed. **(To be specified for child height indoor, or shaded outdoor locations subject to severe vandalism.)**

HAWS	OR EQUAL
1107L-1920-BP7-BP6-BottleStand1107 install with two 6700 in-wall 3/16" thick support plates.	

DF-11A: Dual Height - Two unit, access compliant, wall-mounted, one piece 14 gage Type 304 stainless steel dual height (high, low) drinking fountains, with bottle filler constructed of all 14 gauge type 304 stainless steel and no plastic shall be used in its construction for vandal resistance. A laminar flow of water shall be activated with a front mounted and ADA accessible push button and be within ADA reach guidelines when properly installed. Any excess water draining into the fountain basin shall utilize a single common drain for both fountain and bottle filler. All waterways shall be brass free and unit shall be certified to ANSI/NSF 61 and ANSI/NSF 372 lead free. No electricity shall be needed to operate the unit. For bubbler stream activation, a non-proprietary, adjustable flow push button activated cartridge shall be used. Bottle Stand number "BottleStand1107" shall be attached to the drinking fountain bowl directly below the Bottle Filler, as needed. **(To be specified for indoor, or shaded outdoor locations subject to severe vandalism.)**

HAWS	OR EQUAL
1117LN-1920-BP32-BottleStand1107 install with 6700.4 and 6700 in-wall 3/16" thick support plates	

DF-12: Single bubbler, wall mounted white porcelain enamel cast iron drinking fountain, with bottle filler constructed of all 14 gauge type 304 stainless steel powder-coated white and no plastic shall be used in its construction for vandal resistance. A laminar flow of water shall be activated with a front mounted and ADA accessible push button and be within ADA reach guidelines when properly installed. Any excess water draining into the fountain basin shall utilize a single common drain for both fountain and bottle filler. All waterways shall be brass free and unit shall be certified to ANSI/NSF 61 and ANSI/NSF 372 lead free. No electricity shall be needed to operate the unit. For bubbler stream activation, a non-proprietary, adjustable flow push button activated cartridge shall be used. Bottle Stand number "BottleStand1311W" shall be attached to the drinking fountain bowl directly below the Bottle Filler, as needed. **(To be specified for Child-Height for indoor or outdoor general use.)**

HAWS	OR EQUAL
Haws 1311-1920W-BP8W-BP6W-BottleStand1311W install with two 6700 in-wall 3/16" thick support plates.	

DF-12A: Dual Height - Two unit, access compliant dual height (high low) white porcelain enamel cast iron drinking fountains, with bottle filler constructed of all 14 gauge type 304 stainless steel powder-coated white and no plastic shall be used in its construction for vandal resistance. A laminar flow of water shall be activated with a

front mounted and ADA accessible push button and be within ADA reach guidelines when properly installed. Any excess water draining into the fountain basin shall utilize a single common drain for both fountain and bottle filler. All waterways shall be brass free and unit shall be certified to ANSI/NSF 61 and ANSI/NSF 372 lead free. No electricity shall be needed to operate the unit. For bubbler stream activation, a non-proprietary, adjustable flow push button activated cartridge shall be used. Bottle Stand number "BottleStand1311W" shall be attached to the drinking fountain bowl directly below the Bottle Filler, as needed. **(To be specified for indoor or outdoor general use.)**

HAWS	OR EQUAL
Haws 1501-1920W-BP32W-BottleStand1311W install with 6715 and 6700 in-wall 3/16" thick support plates.	

2.09 DRUM TRAPS

A. Schedule Numbers:

DT-1: Extra heavy cast iron, bolted top.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
8714	ZA1180	SI-742-X	MI-SOLID-S	61030	

DT-2: Aluminum solid interceptor, furnish for on-floor installation.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
8710-AA	Z-1180	SI-742	MI-SOLID-S-AL	61030-26	

2.10 DIELECTRIC UNIONS

A. Schedule Numbers:

1. Dielectric style Unions using ferrous and no-ferrous metals are prohibited. Dielectric flanges are admitted for use – see DU-2.

DU-1: Lead Free Brass union with 6-inch Lead Free Brass nipple.

DU-2: Lead Free Brass flanged fittings with 6-inch Lead Free Brass nipples are to be used in between pipes made of dissimilar metals to prevent accelerated corrosion and deterioration in the piping systems due to galvanic and stray current.

WATTS	WILKINS	ZURN	NIBCO	OR EQUAL
LF3100M3			733-LF	

2.11 EMERGENCY EYE WASH / EMERGENCY SHOWER

(Emergency eye wash/emergency shower equipment must meet OSHA safety order requirements)

A. Schedule Numbers:

EEW-1: Access compliant combination emergency shower and fold-away eyewash mounted in a flush mounted recessed stainless steel cabinet with concealed piping: Eyewash: eye/face wash in a stainless steel door/water tray assembly folds up flush into stainless cabinet. Shower: access compliant shower activation by pull lever handle mounted 42 to 45 inches above the finished floor, located inside of stainless steel cabinet, supplying an exposed 20 gpm flow regulated stainless steel shower head, mounted between 82 and 96 inches above finished floor. Unit is access compliant when eye/face wash spray outlet is mounted at a height of 36 inches above finished floor. Provide 30 inches wide by 48 inches deep clear floor space for access compliance. (**To be specified in Middle School and High School Science Lab Classrooms.**)

HAWS	GUARDIAN	ACORN SAFETY	BRADLEY	OR EQUAL
8356WCC	GBF2150-FC20	S2260-BF-PAN-RA	S19345JXB	

EEW-2: Access compliant combination emergency shower and fold-away eyewash mounted in a wall-surface mounted stainless steel cabinet. Eyewash: Eye/face wash in a stainless steel door/water tray assembly folds up flush into stainless steel cabinet. Shower: access compliant shower activation by pull lever handle mounted 42 to 45 inches above the finished floor, located inside of stainless steel cabinet, supplying an exposed 20 gpm flow regulated stainless steel shower head, mounted between 82 and 96 inches above finished floor. Unit is access compliant when eye/face wash spray outlet is mounted at a height of 36 inches above finished floor. Provide 30 inches wide by 48 inches inch deep clear floor space for access compliance.

(To be specified in Middle School and High School Lab Classrooms where recessed cabinet cannot be used.)

HAWS	GUARDIAN	ACORN SAFETY	OR EQUAL
8356WCSM	GBF2173	S2460-PAN-RA	

EEW-3: Access compliant deck mounted eye/face wash, chrome plated brass flow regulated fold-down Eye/face wash assembly mounted on the back-ledge of the sink, water is automatically activated when the assembly is pulled forward and down over the sink. The floor space for the approach, the sink size, the counter height, and under-counter knee clearance must be adjusted to meet accessibility requirements; the Eye/face wash spray heads should not exceed 36 inches above the finished floor.

(To be specified only at Science Prep Rooms immediately accessible to a lab that has a deluge shower. At Prep Rooms not immediately accessible to a lab with a deluge shower, specify an emergency shower/eyewash combination unit instead.)

HAWS	GUARDIAN	ACORN SAFETY	BRADLEY	OR EQUAL
7610	GBF1779	S0860-RH	S19274JDB	

EEW-4 Floor mounted combination emergency shower and eyewash shower: maximum output flow controlled to 20 gpm, chrome plated bronze stay-open shower control valve with stainless steel valve stem and stainless steel lever and pull rod. 1 ¼-inch galvanized pipe and fittings, with alternate 1 ¼-inch inlets and 9-inch diameter floor flange. Eye/Face Wash: Stainless steel eyewash bowl, pressure regulating flow controlled Eye/face wash with auto-open protective cover, chrome plated bronze stay-open eyewash valve with stainless steel ball and valve stem, protected by an easily serviceable in-line 50 by 50 mesh chrome plated brass strainer, large stainless steel push paddle for hand operation.

(To be specified in Pool Chlorination Rooms, Maintenance, Mechanical, or Janitorial spaces where chemicals and injurious irritants are stored or routinely used; access compliant.)

HAWS	GUARDIAN	ACORN SAFETY	BRADLEY	EQUAL
8309WC	GBF1909	S1340-BF	S19314AA2AEDA00	

2.12 ELECTRIC WATER COOLERS

A. Water Coolers shall be provided with brass free waterways and lead mitigating water filtering systems (DFWF).

B. Schedule Numbers:

EWC-1: Wall-mounted electric chiller type UL listed for access compliant with minimum capacity of 8.0 GPH certified to comply with Air Conditioning and Refrigeration Institute (ARI) Standard 1010/73. Fountain with brass free waterways shall be furnished with stainless steel apron and cabinet push bar operated bubbler, automatic stream regulator, brass P-trap, and hermetically sealed, air-cooled condensing unit with 115 volt, single phase 1/5 HP motor with thermal overload protection (Hubbell No. 5264 or equal). Provide with approved 3-wire grounding cord and connector. Complete water cooler must have been tested and certified to ANSI/NSF 61 and NSI/NSF 372 lead free.

HALSEY TAYLOR	ELKAY	MURDOCK	OR EQUAL
HAC8SS-NF	EHFSA8	A171408F	

EWC-2: Dual-height electric water cooler, same mechanical specification as EWC-1 except fully access compliant, with dual height stainless steel drinking fountains sharing a common waste, water supply and refrigeration. Complete water cooler must have been tested and certified lead free to ANSI/NSF 61 and NSI/NSF 372 lead free.

(To be specified for Administration Area, and Teachers' Lounge.)

MURDOCK	ELKAY	HALSEY TAYLOR	OR EQUAL
A172408F-UBL	VRCHDTL8SC	HAC8BLPV-NF	

2.13 FAUCETS

A. Access compliant faucets: Force to activate controls shall be no greater than 5 pounds. Self-closing metering, where specified, to remain open 10 seconds minimum when activated. Handles shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.

B. Schedule Numbers:

F-1: Wall mounted ¾ inch hose-thread spout faucet with vacuum breaker with integral service stops and top wall brace, adjustable eccentric union inlet connections, rough chrome.

(To be specified for service sink and can wash.)

CHICAGO	AMERICAN STANDARD	ZURN	OR EQUAL
897-RCF	8344.112-RC	Z843MI-RC	

F-2: Wall mounted stainless steel 8 inch spread faucet with lever handles and 8 inch swing spout with brass free waterways. **(To be specified for Faculty Dining Room, Nurses Station, Culinary sinks and food preparation sinks.)**

FISHER	OR STAINLESS STEEL EQUAL
53112	

F-3: NOT USED

F-4: Wall mounted stainless steel single water inlet fitting with 8 inch swing spout with brass free waterways. Furnish with lever handles and water conservation type aerator.

(**To be specified for use at pot sinks, over range tops and Photo Finishing Rooms.)**

FISHER	OR STAINLESS STEEL EQUAL
67628	

F-5: Wall mounted single water inlet with a double jointed swing spout, heat resistant handle control valve, stainless steel.

(To be specified for pot sinks and over range tops – Engineer / Designer to specify the type and length of spout.)

FISHER	OR STAINLESS STEEL EQUAL
54119 OR 54836	

F-6: Deck mount, single hole, hot and cold faucet with copper water supply.

(To be specified for use in Multi-Purpose Rooms, Work Rooms, and in Photography Dark Rooms.)

CHICAGO	ZURN	OR EQUAL
50CR44952AB	Z826A1-XL-CST-MY	

F-7: Wall mounted, hot and cold, faucet with serrated nozzle and vacuum breaker assembly. **(To be specified for use in Photography Negative Rooms)**.

CHICAGO	ZURN	T&S BRASS	OR EQUAL
445-219948		BL-5775-08	

F-8: Wall mounted, cast brass, hot and cold faucet with adjustable Centers and with 5 ½-inch gooseneck spout.

(To be specified for use in Graphic Arts Room.)

CHICAGO	ZURN	T&S BRASS	OR EQUAL
445-218173AB	Z841C1-5F	B-0290-LN WITH 059X 6 INCH SPOUT	

F-9: Single handle wall mounted - cold water only - faucet with chrome finish.

(To be specified for use in Shops or classrooms with a single wall mounted faucet.).

CHICAGO	ZURN	OR EQUAL
332-E35ABCP	Z875F1-15F	

F-10: Single deck mounted hot and cold faucet, rough-plated brass with vacuum breaker top brace, with hose end. Provide with copper tubing connectors.

(To be specified for Science Room Demonstration Table and Science Prep Rooms in laboratory classrooms.)

T&S	CHICAGO	ZURN	OR EQUAL
BL-5700-09	930CR44720	Z826U1-6M-MY	

F-11: Deck mount single handle with 5 ½-inch goose neck spout laboratory type faucet with serrated hose outlet and vacuum breaker**.**

(To be specified for Peninsula Units & Island Type Workstations in Modern Science, Chemistry and Biology Rooms.)

CHICAGO	T & S	ZURN	OR EQUAL

928-369CP	BL-5709-08	Z-825 – U16M	

F-12: Deck mounted stainless steel 8 inches wide spread faucet, with 8-inch swing spout, aerator and lever handles. **(To be specified for food preparation sinks, Culinary Sink, Nurses Station and Faculty Dining Rooms.)**

FISHER	OR STAINLESS STEEL EQUAL
57649	

F-13: Wall mounted laboratory faucet with vacuum breaker and lab nozzle outlet. Heavy chrome-plated, single turret assembly, nickel and copper composition, ½ inch iron pipe size concealed angle stop with extended stem and spoke handle with vandal-proof plastic index button.

(To be specified for use in High School Science Room fume hood.)

CHICAGO	T & S	WATER SAVER	OR EQUAL
980-GN2BVBE7CP Stop: 962V0ABCP	BL-5560-01 BL-4720-02 BL-4750-01	L171WSA with VB L-2885 N-7	

F-14: 4-inch center set lavatory faucet self-closing metering, to remain open 10 seconds minimum when activated., Hot and cold water inlets, adjustable time cycle and chrome plated finish. Provide with copper tubing connectors. To be used with 4-inch center set Lavatory Sink.

(To be specified for Faculty restrooms, Student store and Cafeteria hand wash sinks - Access compliant.)

CHICAGO	ZURN	T & S	OR EQUAL
3600CR44597AB	Z86500-XL	B-2760-H	

F-15: Single water inlet lavatory faucet self-closing metering, to remain open 10 seconds minimum when activated. Adjustable time cycle with vandal resistant base plate and chrome plated finish.

(To be specified for student restrooms).

CHICAGO	ZURN	OR EQUAL
3400-ABCP	Z86100-XL-CP4	

F-16: Deck mounted, single lever handle, cold water inlet fitting, with rigid swinging goose neck spout and aerator.

(To be specified for Art Classrooms, Shop and Industrial Craft Rooms, Ceramic, Science Rooms-replacement only, Elementary Classrooms, Kindergarten Classrooms, and Special Education, Classrooms).

CHICAGO	ZURN	JUST	T&S	OR EQUAL
350-E35ABCP	Z825B1-XL-15F	JSFVR-5	B-0305	

F-17: Vertical wall mounted fitting with lever handles, rigid gooseneck spout and spray outlet. **(To be specified for all 3-foot wash sinks with vertical outlets for Art classroom, Shop and Industrial Craft rooms and Ceramic classrooms.)**

CHICAGO		OR EQUAL
225-261ABCP		

F-18: Flushing Rim Sink faucet with atmospheric Vacuum breaker, ¾-inch hose tread outlet and wrist blade handles.

(To be specified for all clinical sinks for special education.)

CHICAGO	ZURN	T&S BRASS	OR EQUAL
814-VBCP	Z842D6-LSI-5XT	B-0651-06 W/ 6" INCH WRIST HANDLES	

F-19: Deck mounted, stainless steel, 4-inch center set lavatory faucet wrist blade handles, hot and cold water inlets and chrome plated finish.

(To be specified for Nurse's office Lavatory Sink)

FISHER	OR STAINLESS STEEL EQUAL
58750 or 58696 with 6-inch gooseneck	

F-20: Wall mounted, hot and cold faucet, chrome plated, with lever handles and 9 or 9 ½-inches goose-neck spout.

(To be specified for use in Administration Offices, Conference Rooms, Teacher Workrooms, and Library.)

CHICAGO	ZURN		OR EQUAL
445-L9E35ABCP	Z842J1-XL-5F		

F-21: Deck mounted, hot and cold faucet with lever handles, rigid swinging goose-neck spout and aerator.

(To be specified for use in Administration Offices, Conference Rooms, Teacher Workrooms, and Library.)

ZURN	CHICAGO	OR EQUAL
Z826B1-XL-CST	50CR44952AB	

F-22: Stainless steel deck mounted, single lever handle, cold water inlet fitting, with swinging goose neck spout, brass free waterways and aerator.

(To be specified for use in Elementary and Kindergarten Classroom sinks.)

FISHER	JUST	OR STAINLESS STEEL EQUAL
58149, 58017	JSFVR-5	

F-23: Deck mounted stainless steel 8 inches widespread faucet, with 12-inch swing gooseneck spout, aerator and lever handles.

T&S	OR STAINLESS STEEL EQUAL
3315	

2.14 FLOOR DRAINS

A. Schedule Numbers:

FD-1: Cast iron body, no hub with seepage pan and flat, round nickel bronze strainers not less than 5-inch diameter for 2-inch outlet bodies, 7-inch for 3-inch outlet bodies and 8-inch for 4-inch outlet bodies, with maximum of ½ inch square holes or slots not larger than ¼ inch by 1 ¼-inch.

(To be specified for use in locations other than tile floors.)

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
2005Y-A	ZN-415-B	FD-100-A	F1100-C-1	30000-A	

FD-2: Same as specified for FD-1, except with square tops.

(To be specified for use in tile floors.)

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
2005Y-B	ZN-415-S	FD-100-M	F1100-C-S-1	30000-S	

FD-3: Area type, with 8-inch diameter minimum cast iron top grates (no hub). Drain shall be vandal-proofed by securing grate to body with stainless steel Allen flat-head screws.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
2110-Y-U	Z-550-VP	FD-320-Y-6	F1320-4-6	32100-VP-Z	

FD-4: Pavilion type with cast iron hinged top, with removable sediment bucket. Drain shall be vandal-proofed by securing grate to body with stainless steel Allen flat head screws. No hub; 4-inch drain in lunch area in lieu of clarifier.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL

2230-Y-H-U	Z-610-H-NH-UP Z-541-NH-VP-H	FD-340-Y-SET-9-6	F1340-TFB-4-6	37810-14-VP-Z	

FD-5: Gang shower, cast iron body with 5-inch diameter nickel-bronze vandal-proof strainer. No hub.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
2005-Y-NB-U-(A)	ZN-415- B-VP	FD-100-A-6	F1100-C-1-6	30000-A-VP	

FD-6: For indirect waste. Cast iron body, with vandal-proof nickel-bronze top and funnel. No hub.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
3510-F11-NB5	ZN-415-E	FD-100-EF-1	F1100-C-EF-1	30000-E2-VP	

FD-7: Drain parking garage floor (emergency drain) with cast iron body, flashing collar and cast iron tractor grate NO hub, vandal-proof top.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
2120Y-U	ZN-508-9-INCH VP	FD-320-Y-6	F1320-4-6	32100-TG-VP	

FD-8: Area drain, cast iron body, round pedestrian grate set in square frame.

SMITH	ZURN	WATTS	MIFAB	JOSAM	EQUAL
1470Y-U-NB	ZN-158-VP	RD-200-CP-L-1	F1100-C-S8-1-6	23730-VP	

FD-9: Planter drain, cast iron body, secured bronze dome with stainless steel mesh screen.

J.R.SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
1915	ZRB-352 with Z-1040 adaptor	FD-860	F1810-6	39600	

FD-10: Trash Drain Wash down Area Drain: Waste water diversion valve drain acts as an area drain for sanitary and rain drainage. When the hose Bibb is activated, the drain automatically diverts run offs to sanitary drain. Unit shall be approved by IAPMO.

FOX Waste Water Diversion Valve System:	OR EQUAL
DD 600	

2.15 FLEXIBLE HOSES

A. Schedule Numbers:

FLH-1: Braided stainless-steel metal hose (for gas and non-pressure condensate drainage connection use). US Flex, Metraflex, Nelson Dunn or equal.

FLH-2: Braided bronze metal hose (for interior non-pressure condensate drainage connection use only). US Flex, Metraflex, Nelson Dunn or equal.

2.16 FLUSH VALVE ASSEMBLY

A. Valves shall be furnished so that flush remains constant and will not require any adjustment.

1. Each flush valve shall be provided with a loose key, square shank, lock shield angle service stop connected to flush valve with a union connection.

2. Provide l7 gage pressed brass escutcheons for wall and fixture. Escutcheons shall be fastened to not turn or rattle.

3. Each flush valve shall be furnished with a vacuum breaker providing one inch opening to atmosphere, which will not leak under any degree of back pressure and will not restrict rate of flow more than 10% at 10 PSI, and will operate noiselessly.

4. Tailpiece shall not be lighter than 17 gage and shall be part of flush valve assembly.

5. Exposed metal parts of flush valve assembly shall be nickel or chromium-plated on a brass or copper base.

6. Refer to 2.02.E for fixture supplies.

7. Controls for water closet flush valves shall be mounted on the wide side of toilet areas.

B. Schedule Numbers:

FLV-1: Automatic Flush Valve for Water Closets: Battery-powered, sensor-operated, 17 gage chrome-plated brass or heavier with cover and with metal cover manual override button. Shall deliver 1.28 gallon of water at each operation.

SLOAN	ZURN	OR EQUAL
Royal 111 SMO-1.28	ZER6000AV-HET-CPM	

FLV-1a: Manual Flush Valve for Water Closet: Shall deliver 1.28 gallon of water at each operation.

SLOAN	ZURN	OR EQUAL
Royal 111-1.28	Z6000AV-HET	

FLV-2: Automatic Flush Valve for Urinals: Battery-powered, sensor-operated, automatic flush valve. Flush valve at 1/8 gallons per flush with manual override feature.

SLOAN	ZURN	OR EQUAL
Royal 186 SMO-0.125-DBP-OR	ZER6003AV-ULF-CPM	

FLV-2a: Manual Flush Valve for Urinals: shall deliver 1/8 gallon of water per flush.

SLOAN	ZURN	OR EQUAL
Royal 186-0.125-DBP	Z6003AV-ULF	

2.17 FLOOR SINKS

A. Schedule Numbers:

FS-1: Round, cast iron, acid-resistant enamel body with bottom aluminum dome strainer, less grate.

(To be specified for use in Multi-Purpose Buildings and Cafeteria Buildings.)

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
3400Y-10	Z-1950-1	FS-760-22	FS1760-22	49580A	

FS-2: 6 inches to 8 inches deep, square cast iron acid-resistant enamel, bottom aluminum dome strainer with nickel bronze rim and grate top.

(To be specified for use in Multi-Purpose Buildings, High School Cafeteria and Mechanical Equipment Rooms.)

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
3140Y 3150Y	Z-1901 ZN-1900	FS-740-1 or FS-730-1	FS1720-1, FS1730-1	49320A-NB, 49340A-NB	

FS-3: Round, cast iron body with dome bottom strainer, under deck clamp and 2-inch high water dam; no hub type.

(To be specified for outdoor use near cooling tower, near rooftop HVAC unit, chillers, Mechanical Equipment Rooms.)

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL

3980Y-C	Z-108-NH	RD-400-F	R1200-RS-U	25500-1	

2.18 GREASE TRAPS (INTERCEPTORS)

A. Schedule Numbers:

GT-1: Cast iron, basket baffle assembly, Los Angeles City approved type.

BIG DIPPER	JR SMITH	JOSAM	ZURN	WATTS	MIFAB	OR EQUAL
	8000	60100H	1170	WD SERIES	MI-G	

GT-2: Pre-fabricated reinforced concrete with cast iron fittings, with manholes brought to grade. Size and capacity as indicated on Drawings. Los Angeles City approved.

BROOKS	JENSEN	PROCAST	OR EQUAL

2.19 HOSE BIBBS

A. Hose Bibbs or Hydrants serving outside eating shall be ¾" supplied with minimum 1" water line.

B. Schedule Numbers:

HB-1: For plaster or stucco wall, furnished with box and stop, exposed trim chrome-plated, with or without door and with vacuum breaker.

(To be specified for use in swimming pool area, outside eating area and at 75 feet spacing around exterior building walls.)

ACORN	WOODFORD	PRIER	OR EQUAL
8141, 8151	B75	C-633NFC	

HB-2: For brick, CMU and poured in place concrete walls, furnished with box and stop, exposed trim chrome-plated, with or without door and with vacuum breaker.

(To be specified for use in swimming pool area, outside eating and 75 feet spacing around exterior building wall.)

ACORN	WOODFORD	PRIER	OR EQUAL
8141, 8104, 8151	B75	C-633NFC	

HB-3: ASTM B 62 bronze body, rubber composition disc or renewable seat, straight nose with brass die cast or enamel iron hand wheel and with vacuum breaker.

(To be specified for use for Lath House.)

ACORN	ZURN	WOODFORD	PRIER	OR EQUAL

8131-RBVB	Z-1343-VB	Y24	C-155	

HB-4: Same as HB-3 except furnish loose key stop and lockshield.

(To be specified for use at animal wash-down areas.)

ACORN	ZURN	WOODFORD	PRIER	OR EQUAL
8131-LK-RBVB	Z-1343-VB-LK	Y24 WITH LOOSE TEE KEY	C-155	

HB-5: Same as HB-3 except furnish with bent nose. **(To be specified for use at roof top AC Unit. Mechanical Equipment Room, Boiler Rooms, etc.)**

ACORN	ZURN	CHAMPION	PRIER	OR EQUAL
8126-LK-RBVB	Z-1343-VB-LK	B-401 LK	C-255NP	

HB-6: Same as HB-4 except furnish with bent nose and loose key handle.

(To be specified for use in exterior Agricultural Plot.)

ACORN	ZURN	CHAMPION	PRIER	OR EQUAL
8126-LK-RBVB	Z-1343-VB-LK	B-401LK	C-255NP	

HB-7: Renewable seat, rough chrome finish, bronze body, flanged 3/4 inch I.P.S. with Female thread inlet, loose key, and vacuum breaker.

ACORN	CHICAGO	WOODFORD	PRIER	OR EQUAL
8121-CR	No. 387-E-27	No. 24P-CH-TK	C-255CP	

HB-8: Recessed hose box furnished with wall flange and built-in drip lip. Box shall be one piece construction; door shall have a recessed cam lock. Door shall remain up and out of the way when in fully opened position. Valve shall be replaceable loose key wheel handle and screwdriver stop. Install within 2 feet above finished floor. Provide vacuum breaker.

(To be specified for use in Toilet Rooms.)

ACORN	WOODFORD	PRIER	OR EQUAL
Hose box 8104 or 8151	B75	C-634BX1	

2.20 LAVATORIES

A. Access compliant faucets for Lavatories: Force to activate controls shall be no greater than 5 pounds. Self-closing metering, when specified, to remain open 10 seconds minimum when activated.

B. Cast Iron Lavatories shall be acid resistant enamel and shall conform to Commercial Standards CS 77.63. Unites furnished in conjunction with strainer installation or faucet installation shall be brass. Exposed brass nuts shall be chrome plated.

C. Exposed trim shall be free from sharp edges or points. Fixture shall be furnished with other listed manufacturer specified trim. Instead of solid supply pipe, polished chrome-plated risers, 3/8 inch outside diameter with ferrule stop end and metal nosepiece may be furnished.

D. Insulate cold water, hot water and drain lines under all access compliant lavatories with approved type insulation.

PLUMBEREX	LAV-GUARD	OR EQUAL

E. Schedule Numbers:

L-1: 20-inch by 18-inch cast iron, acid-resistant enamel punched with three holes, 4-inch on center and supplied with tempered or cold water only. Unit shall be furnished with cast iron hangers. Stops shall be loose key, square shank, lock shield type.

(To be specified for use in Student Toilet Rooms, Typing, Math, and Industrial Art Rooms.)

	COMMERCIAL ENAMEL	KOHLER	BRASS CRAFT	CHICAGO	ZURN OR EQUAL
Bowl	551 (3 holes)	K-2867			Z5844-CB
Faucet (See Section 2.13)	F-15	F-15	F-15	F-15	F-15
Drain				327 XCP	Z8743
Supply			HSTR 1720 A-CB-C	1017	ZH-8822-CE-LK

Note: Provide cast iron hangers for sinks.

L-2: Same as L-1, 20-inch by 18-inch cast iron, acid resistant enamel punched with three holes, 4 inches on center and supplied with tempered cold water only. Unit shall be furnished with cast iron hangers. Stops shall be loose key, square shank and lock shield type. **(To be specified for access compliant, student restrooms).**

	COMMERCIAL ENAMEL	ZURN	KOHLER	OR EQUAL
Bowl	553 (3 holes)	Z5844	K-2867	
Faucet (See Section 2.13)	F-15	F-15	F-15	
Drain	Chicago 1-1/4-inch grid drain 327- XCP	Chicago 1-1/4 inch grid drain 327- XCP	Chicago 1-1/4-inch grid drain 327- XCP	OR EQUAL

L-3: 2

	CECO	KOHLER	BRASS CRAFT	CHICAGO	ZURN	OR EQUAL
Bowl	551(3 hole)	K-2867			Z-5844	
Faucet (See Article 2.13)	F-14	F-14	F-14	F-14	F-14	
Drain		K-7715		327A	Z-8743	
Supply			HSTR 1720-A-CB-C	1017	ZH822-CE-LK	

L-4: 20-inch by 18-inch cast iron, acid resistant enamel lavatory with 4-inch center set combination push button metered faucet, supplied with hot and cold water complete with cast iron hangers. **(To be specified for access compliant installations at faculty restrooms)**.

	COMMERCIAL ENAMEL	ZURN	KOHLER	OR EQUAL
Bowl	553 (3 holes)	Z5844	K-2867	
Faucet (See Article 2.13)	F-14	F-14	F-14	
Drain	Chicago 1 ¼-inch grid drain 327-XCP	Chicago 1 ¼-inch grid drain 327-XCP	Chicago 1-1/4-inch grid drain 327- XCP	OR EQUAL

L-5: 20-inches by 18-inches cast iron, acid-resistant enamel, with 4-inches on center set combination faucets with lever handles supplied with hot and cold water complete with hanger.

(To be specified for access compliant installations at Nurses' office and Health Units).

	AMERICAN STANDARD	CECO	KOHLER	BRASS CRAFT	CHICAGO	ZURN OR EQUAL
Bowl		553(3 hole)				
Faucet (See Article 2.13)	F-19	F-19	F-19	F-19	F-19	F-19
Drain	2411.015	K7715	K-7715		327A	Z8743
Supply				HSTR-1720-A-CB-C	1017	ZH-822-CE-LK

L-6: 16-inch by 14-inch (or size indicated on Drawings), enamel cast iron, complete with combination push button metered faucet, supply and drain fitting.

(**To be specified for use in Student Store.)**

	KOHLER	CHICAGO	BRASS CRAFT	ZURN	OR EQUAL
Bowl					
Faucet (See Article 2.13)	F-14	F-14	F-14	F-14	
Drain	K-7715	327A			
Supply		1017	HSTR 1720A-CB-C	ZH822-CE-LK	

2.21 LABORATORY GAS VALVES

A. Gas valves shall be protected by access-compliant and serviceable electronically-operated gas solenoid valve. This valve shall be remotely operated by a recess-

mounted controller with an emergency push button. Controller shall be located as close as possible to the teacher's work station with a 48" maximum mounting height for access compliance.

B. Laboratory countertop and tabletop gas valves shall have integral check valves.

C. Schedule Numbers:

LGV-1: Controller with an emergency push button, LED, and key switch in conjunction with a 24-volt, normally-closed solenoid valve.

MANUFACTURER	American Gas Safety, AGS	ISIMET	OR EQUAL
CONTROLER	Merlin 1000Si, 24 VAC, Recessed Mount	LA SERIES, Model: LAV2-LV-K-F-G-X	
SOLENOID	Normally Closed, Merlin Valve, 24VAC, 1/2" through 2"	Normally Closed, S-300 Series, Model: S-30X-VA-611-F8-U 1/2" through 1-1/4"	

LGV-2: Ground key stop, heavy chrome-plated, nickel and copper composition, double turret at 90 degree angle 3/8 inch international pipe size deck type, with lever handle and vandal-proof plastic index button.

(To be specified for use in Middle School Science Room countertop tables.)

CHICAGO	T & S	WATER SAVER	ZURN	OR EQUAL
982-909CAGCP E7TC	BL-4200-02	YR2900-132AWSA	Z88200-Z-8001B-CS	

LGV-3: Laboratory gas valve, same as LGV-2, except single turret.

(To be specified for use in Middle School Science Room demonstration table.)

CHICAGO	T & S	WATER SAVER	ZURN	OR EQUAL
980-909CAGCP E7TC	BL-4200-1	YR2900-131- WSA	Z88200-Z-8001B-CS	

LGV-4: Same as LGV-2, except double turret at 180 degree angle.

(To be specified for use in High School Chemistry, Physiology, Biology, Physics, Modern Science and Science Room peninsula table.)

CHICAGO	T & S	WATER SAVER	ZURN OR EQUAL
981-909CAGCP E7TC	BL-4200-2	VR2900-132SWSA	Z-88200-Z-8001B-CS

LGV-5: Ground key stop, heavy chrome-plated, nickel and copper composition, single turret, wall-mounted, 3/8 inch international pipe size with lever handle and vandal-proof plastic index button.

(To be specified for use in Middle School Science Work Rooms.)

CHICAGO	T & S	WATER SAVER	ZURN	OR EQUAL
986-909AGVCP E7T	BL-4250-01	L2900-158	Z-88600-Z8001B	

2.22 LAUNDRY TRAYS AND TRIM

A. Sinks specification herein shall be furnished with strainer and tailpieces unless otherwise noted. Supplies shall be 3/8-inches outside diameter.

B. Schedule Numbers:

LT-1: Cast iron, acid-resistant enamel, with strainer and 1 ½-inches tubing tailpiece, 24-inch by 21-inch by 13 ½-inch in cabinet top, with faucet, strainer and tray.

(To be specified for use in High School and Elementary Special Education, Storage/Laundry Room; access compliant.)

	AMERICAN STANDARD	CHICAGO	KOHLER	ZURN	CECO OR EQUAL
Tray sink					
Faucet	F-6 (Article 2.13, Faucets)	F-6	F-6	F-6	F-6
Strainer	4320.024		K-8807		OR EQUAL

LT-2: Cast iron, acid-resistant enamel, 24-inch by 20-inch by 13-inch, black angle frame, with wall mounted faucet strainer and tray.

	AMERICAN STANDARD	KOHLER	CHICAGO	ZURN	CECO OR EQUAL
Tray sink					804

Faucet	F-3B (See Article 2.13, Faucets)	F-3B	F-3B	F-3B	F-3B
Strainer	4362.026	K-8820		Z8736	OR EQUAL

2.23 PIPE HANGERS

A. Refer to Section 22 0513: Basic Plumbing Materials and Methods.

B. Schedule Numbers:

1. PH-1: Complete with clamps, inserts, etc.

SUPERSTRUT	UNISTRUT	TOLCO	B-LINE	OR EQUAL

2.24 P-TRAPS

A. Schedule Numbers:

PT-1: Cast brass complete, chrome-plated.

AB&A	OR EQUAL
107 or 108 chrome 1-1/2”x1-1/4”.	

2.25 PRESSURE REGULATING VALVE ASSEMBLIES

A. Schedule Numbers:

PRV-1: Furnish for sizes ½-inch to 2-inch water service, all bronze body, stainless steel seat, bronze strainer, calibrated springs, and corrosion resistant, adjustable control.

WILKINS	WATTS	OR EQUAL
500XL- YSBR-HLR	LF223S-B-HP	

PRV-2: Furnish for sizes 2 ½-inch and larger: Automatic (pressure) control valve-pilot controlled and diaphragm actuated pressure control valve, straight or angle pattern, flanged inlet and outlet connection, fusion bonded epoxy coated inside and out with stainless steel cover, stainless steel pilot, stainless steel bolts and nuts, and stainless steel flexible tubing in a compact configuration, vandal resistant bolt-on pilot controller, ¼ ball valve on all pilot control lines, and stainless steel internal parts.

WATTS	CLA-VAL	OR EQUAL
LFM115	90-01	

PRV-3: Furnish for sizes 1 ½-inch and larger; air service, Japanned steel, spring loaded, brass forging body, nylon reinforced neoprene diaphragm, inlet pressure up to 250 pounds, reduced pressure 5 pounds to 60 pounds.

MASON-NEILAN		MASTER PNEUMATIC	OR EQUAL
71 ½-inch	3464, ½ inch 3466, 3/4-inch	VANGUARD R200	

PRV-4: Furnish for gas service, spring-loaded model, Buna N rubber composition or leather valve seat disc and diaphragm, CSA/ANSI Z21.80, inlet pressure 125 pound maximum.

NORGAS			OR EQUAL
NGR Series			

PRV-5: Furnish for gas service for (unit heaters, boilers, and similar installations). Spring-loaded model, Buna N rubber composition, or leather valve seat and diaphragm suitable for temperatures to 150 degrees F.; maximum inlet pressure one pound. Outlet pressure 4 inches to 10 inches adjustable; orifice to suit. For pilot lines and main burners.

REPLIANCE	MAXITROL	HONEYWELL	OR EQUAL
A3000 Series	RV	V5172 Series	

2.26 ROOF DRAINS

A. Schedule Numbers:

RD-1: Low profile dura-coat cast iron body dome strainer type.

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
1010Y-ERC-CID	Z-100-ERC-M	RD-300-F-D-K40	R1200-EU-M	21500-22	

RD-1A:

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
1010Y-R-C-CID	Z100-89-RC-M	RD-300-D-K40	R1200-M-B-U	21500-17-22	

RD-2: Cast iron body with standpipe. (Specify for use as overflow.)

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
1080Y-ERC-CID	Z-100-89-ERC-M	RD-300-R-F-B-D-M	R1200-R-EU-M	21500-3-16-22	

RD-2A:

SMITH	ZURN	WATTS	MIFAB	JOSAM	OR EQUAL
1080Y-R-C-CID	Z100-89-RC-M	RD-300-R-B-D-M	R1200-R-M-B-U	21500-3-17-22	

RDN-1: Downspout Nozzle: Furnish No-HUB outlet and adaptor, Cast Bronze Nozzle and Wall Flange with mounting holes.

SMITH	ZURN	OR EQUAL
1770Y	Z199	

2.27 SHOWER ASSEMBLIES

EDIT NOTE: WATER TO ALL SHOWERS FOR STUDENT USE SHALL BE TEMPERED, ON A LOOPED HEATED PIPING SYSTEM.

A. General Requirements:

1. All shower and diverter valves and related components shall be concealed within the wall, along with all required supply and outlet piping.
2. Hand held shower slide bars have been omitted.
3. Hand held shower wall brackets shall be used in place of prior specified slide bars
4. Shower heads and hand-held showers shall have maximum flow rate of 1.8 GPM.
5. All showers and diverter valves internal working components shall be constructed of brass or stainless steel. Ceramic disk and/or plastic cartridges of any type are not accepted.
6. Reference Plumbing Standard Technical Drawings P-032 thru P-035 for placement of all ADA shower components.
7. All finish trim components, to include trim plates, flanges, handles, etc., shall be polished chrome of metal material. Plastic components of any type shall not be accepted.

B. Schedule Numbers:

SA-1:

1. Standard students shower stall. Provide tempered water.

2. Institutional Shower Head: Polished chrome, single spray mode, 30-degree spray angle, ½" IPS connection, vandal resistant, maximum flow rate of 1.8 GPM.

3. Metering Shower Valve: Concealed cast brass metering shower valve with adjustable cycle time, 2-port - ½" IPS connections, integral service stops, polished chrome vandal resistant metal trim plate and handle, ASME A112.18.1 certified.

4. Approved manufacturers and products:

    a. Symmons: 4-420 Metering Shower Valve with 4-295-1.5 Shower Head.

    b. Or Equal.

SA-2:

1. Standard staff shower stall. Provide hot and cold water.

2. Institutional Shower Head with Ball Joint: Polished chrome, single spray mode, ½" IPS female ball joint connection, maximum flow rate of 1.8 GPM.

3. Pressure Balance Mixing Valve: Concealed cast brass 3-port pressure balancing mixing shower valve, ½" IPS connections, integral service stops, brass temperature limit stop screw. All valve internal components shall be brass and/or stainless steel, polished chrome metal trim plate with polished chrome metal ADA compliant vandal resistant lever handle, ASSE 1016 certified.

4. Approved manufacturers and products:

    a. Symmons: 9601-PLR-B-1.5-TRM Shower with 261XBODY Pressure Balancing Valve.

    b. Or Equal.

SA-3:

1. ADA staff & special educational shower stall. Provide tempered and cold water. For the installation refer to standard detail P-034 or P-035.

2. Institutional Shower Head with Ball Joint: Polished chrome, single spray mode, ½" IPS female ball joint connection, maximum flow rate of 1.8 GPM.

3. Pressure Balance Mixing Valve: Concealed cast brass 3-port pressure balancing mixing shower valve, ½" IPS connections, integral service stops, brass temperature limit stop screw. All valve internal components shall be brass and/or stainless steel, polished chrome metal trim plate with polished chrome metal ADA compliant vandal resistant lever handle, ASSE 1016 certified.

4. Hand Held Shower Assembly: ADA compliant single mode hand shower with non-positive shut off button, maximum flow rate of 1.8 GPM, 60" flexible stainless-steel hose with ½" IPS polished chrome wall supply elbow, cast brass wall supply flange, hand held wall bracket, and in-line polished chrome vacuum breaker.

5. Diverter: Concealed cast brass, dual outlet, non-shared diverter valve, ½" IPS connections, polished chrome metal trim plate with polished chrome metal ADA compliant vandal resistant lever handle.

6. Approved manufacturers and products:

    a. Symmons: Trim less grab bar and less head: 9605BL1L7TRM.

    b. Hand Spray Less Wand: T-300-L2.

    c. ADA Wand: ADACHS-1.5.

    d. Shower Head: 4-295-282-1.5.

    e. Pressure Balancing Valve: 261XBODY.

    f. Diverter Valve: 2DIVBODYNSSRT.

    g. Or Equal.

SA-4:

1. ADA students shower stall. Provide tempered and cold water. For the installation refer to standard detail P-032 or P-033.

2. Institutional Shower Head with Ball Joint: Polished chrome, single spray mode, ½" IPS female ball joint connection, maximum flow rate of 1.8 GPM.

3. Pressure Balance Mixing Valve: Concealed cast brass 3-port pressure balancing mixing shower valve, ½" IPS connections, integral service stops, brass temperature limit stop screw. All valve internal components shall be brass and/or stainless steel, polished chrome metal trim plate with polished chrome metal ADA compliant vandal resistant lever handle, ASSE 1016 certified.

4. Approved manufacturers and products:

    a. Symmons: 9601- PLR-B -1.5-TRM Shower with 261XBODY Pressure Balancing Valve. (Provide two sets.)

    b. Or Equal.

2.28 SERVICE SINKS and TRIM

A. Schedule Numbers:

SS-1: Cast iron, conforming to Commercial Standard CS 77.63 for acid-resistant enamel, 22-inch by 18-inch, with blank back, 2-inch outlet trap standard and rough-plated double faucet with top brace mounted above sink's back, furnished with vacuum breaker and hose end.

(To be specified for custodial use at receiving storage rooms.)

	AMERICAN STANDARD	CECO	KOHLER	ZURN OR EQUAL
Sink		867	K-6714-18	Z5880
Faucet	F-1 (See Article 2.13 – Faucets)	F-1	F-1	F-1
Trap Standard		870-2	K-6672	OR EQUAL

SS-2: Cast Iron corner service sink, conforming to Commercial Standard CS 77.63 for acid-resistant enamel, 28-inch by 28-inch, coated wire rim guard, 2-inch flat strainer and rough-plated double faucet with top brace mounted above sink back, furnished with vacuum breaker and hose end.

(To be specified for use in Custodial Rooms.)

	CECO	American Standard	KOHLER	CHICAGO	ZURN OR EQUAL
Sink	871		K-6710		Z5850
Faucet	F-1 (See Article 2.13 – Faucets)	F-1	F-1	F-1	F-1
Rim Guard	B-872		K-8940		RC
Strainer	B-71-2		K-9142		D-2

2.29 SINKS and TRIM

A. For classrooms, offices and dining room sinks.

B. Access compliant faucets for sinks: Force to activate controls shall be no greater than 5 pounds. where specified self closing metering to remain open 10 seconds minimum when activated.

C. Cast iron sinks shall be acid resistant enamel, and shall conform to Commercial Standards CS 77.63. Units furnished in conjunction with strainer installation or faucet installation shall be brass. Exposed brass nuts shall be chrome-plated. Refer to the Fixture Supplies paragraph of this section.

D. Exposed trim shall be free from sharp edges or points. Fixture shall be furnished with other listed manufacturer specified trim. Instead of solid supply pipe, polished chrome-plated risers, 3/8-inches outside diameter with ferrule stop end and metal nosepiece may be furnished.

E. For access compliant sinks: Insulate cold water, hot water and drain pipes under sinks with district approved type insulation.

PLUMBEREX	LAV GUARD	OR EQUAL

F. Schedule Numbers:

ST-1: Enameled Cast Iron, 24-inch by 16-inch by 5-inch, or 16 gage Type 304 stainless steel 25-inch by 17-inch by 5-1/2-inch, flat rim, with 3 ½-inch flat strainer, and deck mounted stainless steel pantry faucet, mounted on left side center line.

(To be specified for use in Elementary and kindergarten classrooms.)

	HAWS (Enameled Cast Iron)	JUST (Stainless Steel)
Sink	4110 ADA	CRAN-ADA-1725—GR-T
Faucet	F-16 (see 2.13)	JSFVR-5
Strainer	6455	Integral Drain and strainer

ST-2: Same as ST-1, except stainless steel faucet on the right side.

(To be specified for use in Elementary and Kindergarten classrooms.)

ST-3: Cast Iron, 18-inch by 12-inch – 24-inch by 18-inch or 30-inch by 18-inch **(Designer to select and specify the size)** or as indicated on drawings, with basket strainer, hot and cold deck mounted faucet.

(To be specified for use in Administration Offices, Conference Rooms, Teacher Workrooms, Faculty Lounge, Nurses' Workstation, Library and Kiln Room.)

	KOHLER	AMERICAN STANDARD	CECO	HAWS	OR EQUAL
Sink			720C, 720G, 720I		
Faucet	F-12	F-12	F-12	F-12	
Strainer	K-8801	4331.013		6457	

ST-4: Same as ST-3, except with flat strainer and deck mounted faucet.

(To be specified for Art Classroom, Shop and Industrial Craft rooms, Ceramic, Science Room - replacement only, and Special Education Classrooms.)

Strainer	KOHLER	CHICAGO	HAWS	AMERICAN	OR EQUAL

	K-8807		6455	STANDARD 4311.023	
Faucet	F-23	F-23	F-23	F-23	

ST-5: Cast Iron, 18-inch by 12-inch; 24-inch by 18-inch; or 30-inch by 18-inch **(Designer to select and specify the size)** or as indicated on drawings, with flat rim and center outlet. Single compartment, with basket strainer, hot and cold wall mounted CP faucet.

(To be specified for use in Administration Offices, Conference Rooms, Teacher Workrooms, faculty Lounge, Library, and Kiln room.)

	KOHLER	AMERICAN STANDARD	CECO	HAWS	OR EQUAL
Sink			720-C, 720-G, 720-I		
Faucet	F-14	F-14	F-14	F-14	
Strainer	K-8801	4331.013		6457	

ST-6: Same as ST-5, except with wall mounted faucet and flat strainer.

(To be specified for use in Art Classroom, Shop and Industrial Craft Rooms, Ceramic, Science Room - replacement only, and Special Education Classrooms.)

KOHLER	AMERICAN STANDARD	ELKAY	OR EQUAL
Strainer: K-8807	4311.023	LK18	

ST-7 Cast Iron, 32-inch by 21-inch double compartment ledge, with hot and cold faucet, garbage disposal unit in locations indicated on drawings, basket strainer in all other locations. Division tees to be furnished on 2-part waste connected to garbage disposals.

(To be specified for use in Homemaking and Multi-Purpose Rooms.)

	AMERICAN STANDARD	KOHLER	ZURN	OR EQUAL
Sink	7045.804	K-5950-3		
Faucet	F-6	F-6	F-6	
Strainer	433.012	K-8801		

ST-8: Same as SS-1 – (See Section 2.28 – Service Sinks) 24-inch by 18-inch by 6-inch single compartment roll rim with back.

(To be specified for use in Boiler and Equipment Rooms.)

	AMERICAN STANDARD	CECO	KOHLER	ZURN	OR EQUAL
Sink		867	K-6714-18	Z5880	
Faucet	F-1 (See Article 2.13 – Faucets)	F-1	F-1	F-1	
Trap Standard		870-2	K-6672		

ST-9: Cast Iron 48-inch by 18-inch Shop Classroom trough sink with two double faucets, complete with hangers. Sink shall be acid-resistant enamel.

(To be specified for use in Industrial Arts/Crafts and Ceramic rooms.)

	KOHLER	HAWS	CECO	OR EQUAL
Sink	K-3202		204	
Faucet	F-11	F-11	F-11	
Strainer	K-8820			

ST-10: Stainless Steel sink, 16 gauge type 304 SS, various dimensions as required by the project. Use "J" clip option for solid surface tops installations.

(To be specified for use in coordination with OWNER.)

	Just Manufacturing Company	OR EQUAL
Sink	K-3202; SLXD-2131-16-GR; SLXD-2019-16-GR	
Faucet	JSFVR-5	
Drain	Integra Drain	

2.30 SEWAGE EJECTORS

A. Schedule Numbers:

SE-1: Duplex, (unless otherwise indicated) screen-less sewage ejector with two pumps and motors mounted on cover-plate and cover-plate shall be gas tight; furnished with automatic alternator, high water alarm, micro switch liquid level controller starters, fused disconnect switches and factory wired. Sump pit concrete is as specified in a related section.

WEIL PUMP CO.	PACIFIC PUMP CO.	Mc COOK PUMP CO.	HYDROMATIC PUMP	OR EQUAL

2. Motors: Drip-proof with electrical characteristics as scheduled on Drawings.

3. Controls: Weil Model 8230, or equal, mercury float switches, UL listed, two switches for high water alarms with cover mounting brackets. Control panels shall be NEMA 1, UL listed, and each contain following:

   a. Two cross-the-line magnetic starters.

   b. Two fusible disconnect switches.

   c. Two HOA switches.

   d. Two running lights.

   e. One 480/220 volt control circuit transformer.

   f. One high water alarm relay.

   g. One alternator.

   h. One NEMA 1, 4-inch diameter alarm bell for mounting on control panel.

4. Basin Covers: Heavy steel covers, sizes as scheduled on drawings. Covers shall be duplex type with openings for pumps, manholes, and vent openings. Parts shall be gas-tight.

2.31 SERVICE STOP GAS VALVES

A. Schedule Numbers:

SGV-1: Bronze/Brass gas cock valve with double stake packing nut, ½ inch to 2-inch, with IPS, inclusive, with flat or square head. CSA approved**.**

(To be specified for oven ranges, convection ovens, skillets.)

AMERICAN	Mc DONALD	NIBCO	OR EQUAL
85 CBK or 86C	10596, flat 10604, square	GB2A	

SGV-2: Bronze/Brass, ¾-inches to 2-inch IPS (WOG) water, oil, or gas – full port ball valve. CSA approved.

(To be specified for small boilers, pool heaters, and A/C units on roofs.)

WATTS	NIBCO	WILKINS	OR EQUAL
LFFBV-4	F-510-CS-R-66-FS	Model 850	

SGV-3: Cast iron, 2-inch to 4-inch flanged ball valves (WOG) water, oil, or gas. CSA approved.

(To be specified for larger heating equipment.)

WILKINS	NIBCO	WATTS	OR EQUAL
Model 850	F-510-CS-R-66-FS	G4000M1	

SGV-4: Lubricated plug gas valve, 3/4-inch to 2-inch IPS valve.

To be specified for use after gas meter headers, gas regulators, and isolation valves for building isolation, individual floor level isolation, and boiler rooms.)

NORDSTROM	WALWORTH	RESUN	OR EQUAL
142	1786	1430	

SGV-5: Lubricated plug gas valve flanged type 2 ½-inch and larger valve.

(To be specified for use after gas meter headers, gas regulators, isolation valves for buildings isolation, individual floor level isolation and boiler rooms.)

NORDSTROM	WALWORTH	RESUN	OR EQUAL
142	1786-F	1431	

SGV-6: Bronze/Brass ½-inches to 2-inch IPS with lever handle full port ball valve (WOG) water, oil, or gas, CSA Approved.

(To be specified for use in Science, Home Economics, Physics, Biology, physiology, and Modern Science work rooms behind access panel.)

RED and WHITE	NIBCO	WILKINS	OR EQUAL
Fig. 5544	T-585-70-UL T-580-70-UL	Model 80	

SGV-7: Bronze/Brass ½ inch to 2-inch IPS X Flare Appliance ball valves with Tee handle. Flares to be used in conjunction with corrugated flex lines.

(To be specified for clothes dryer, unit heaters, and wall heaters up to 100,000 BTU.)

RED and WHITE	BRASSCRAFT	NIBCO	OR EQUAL
RW 5210 RW 5211 RW 5221	TBV 10-12 TBV 8-8 TBV 6-8	GBV 12 GBV 1516	

2.32 SUMP PUMP

A. Schedule Numbers:

SP-1: Duplex, centrifugal open type impeller and motor mounted cover plated, furnished complete with high water alarm, automatic alternator, float switch, enamel control

panel, with starters, disconnect switches, pilot lights, factory wired, sump pit shall be concrete **(or fiberglass)** as specified in a related section.

WEIL PUMP CO.	PACIFIC PUMPING CO	Mc COOK PUMP CO.	HYDROMATIC PUMP	OR EQUAL
1600 Series				

2.33 STOP VALVES

A. Stops shall be loose key type, ½-inches IPS inlet and outlet chrome-plated brass casting, except as noted.

B. Schedule Numbers:

STV-1: Angle:

CHICAGO,	BRASSCRAFT	NIBCO	OR EQUAL
442-LKABCP		77	

STV-2: Partition:

CHICAGO	T& S BRASS	OR EQUAL
1771-ABCP	B-1028	

STV-3: Straight Type, with Loose Key:

CHICAGO	BRASSCRAFT	T&S BRASS	OR EQUAL
45-LKABCP (1/2 inch)		B-O418	

2.34 THERMOSTATIC MIXING VALVE ASSEMBLIES (TMVA)

A. TMVA's for Domestic Hot Water: Shall be certified to ASSE 1017 or ASSE 1069 based on the application. Valve bodies shall be cast brass or bronze valve assembly provided with holding bracket and shall be installed on wall bracket. Valve shall be rough brass or bronze satin sprayed finish unless otherwise noted. Assembly shall include a dial thermometer, color-coded with white face and black letters. The temperature range between 100º F and 150º F shall be background in red or red line enclosed. Provide a service bypass between cold and tempered water lines. Valve complete with fail safe feature, square shank loose key stops, checks and strainers on both hot and cold-water inlets and shutoff valve on outlet. Valves shall be sized on a 15 to 25 psig (maximum) pressure drop at the following service ranges:

TMVA-1: 5 to 15 GPM.

TMVA-2: 25 GPM.

TMVA-3: 40 GPM.

TMVA-4: 60 GPM.

TMVA-5: 80 GPM.

TMVA-6: 100 GPM.

TMVA-7: 125 GPM.

TMVA-8: 200 GPM.

B. TMVA's for Emergency Shower & Eyewash: Shall be third party certified to ASSE 1071, ANSI Z358.1 and CPC compliant. Capable of supplying safe tempered water at flow rates down to 1 gpm, adjustable from 60º F to 95º F maximum, and having integral ASSE certified cold-water bypass. Valve bodies shall be cast brass or bronze valve assembly with rough brass or bronze satin sprayed finish, provided with an outlet temperature gauge, and having integral check valves and stops, with corrosion resistant materials used throughout. Provide emergency shower & eyewash TMVA's with supply-sized full-port isolation valves secured from unauthorized shut off. Performance and pressure losses for service ranges as follows:

EW-TMVA-1:

5 to 15 GPM, for emergency eyewash or eye/facewash, thermostatically controlled, adjustable from 60º F to 95º F throughout a flow range of 1 gpm through 8.5 gpm at pressure losses of 15 psi or less, with a cold water bypass mode in the event of hot water failure capable of flowing 10 GPM minimum, and with hot water shut-off if the cold water supply fails. Provide with check valves and stops and, 1/2" NPT inlets with 1/2" to 3/4" outlet.

EW-SHWR-TMVA-2:

Up to 25 GPM, for emergency shower & eyewash combination, thermostatically controlled, adjustable from 60º F to 95º F throughout a flow range of 1 gpm through 25 gpm at pressure losses of 20 psi or less, with an automatic 20 GPM minimum cold water bypass mode in the event of hot water failure, and with automatic hot water shut-off if the cold water supply fails. With integral stops and checks, 1-1/4" inlets and 1-1/4" outlet.

EW-SHWR-TMVA-3:

Up to 60 GPM. for multiple emergency shower & eyewash combinations, thermostatically controlled, adjustable from 60º F to 95º F throughout a flow range of 1 gpm through 64 gpm at pressure losses of 20 psi or less, with an automatic 50 gpm cold water bypass mode in the event of hot water failure, and with automatic hot water shut-off if the cold water supply fails. With integral stops and checks, 1-1/4" inlets and 1-1/4" outlet.

C. Manufacturers:

POWERS	T & S	LEONARD	BRADLEY	WATTS	OR EQUAL
HydroGuard Series: LFE480, LFLM, XP	Ultra-Safe	Type TM	Navigator Series High/Low	LFMMV	

2.35 TRAP PRIMERS

A. Trap Primer Requirements:

1. Installed within a recessed lockable access panel with proper clearances for repair and replacement.

2. Shall be installed with line size unions at each end for ease of replacement.

3. Provide an isolation shutoff valve for repair and replacement.

B. Schedule Numbers:

ATP-1: Automatic, multi-trap primer, cast bronze. Minimum pressure drop of 3 PSI shall activate trap seal primers. Limit serving traps to two using Sioux Chief 695-Y52 splitter.

MIFAB	JAY R SMITH	OR EQUAL
MR-500-NPB	2694	

ATP-2: Automatic, Brass. Water flow of 0.5 gpm shall activate trap seal primers.

(Use at locations where no flush valve is available within 20' from the trap primer Only. Connected to a sink/lavatory for serving single trap only.)

PRECISION PLUMBING PRODUCTS	OR EQUAL
Prime-Pro; PRO1-ULP500	

ATP-3: Electronic Trap Primer with recessed access panel. Shall be plugged-in type with provision of a dedicated receptacle to provide 110V power.

(For remote locations where no fixture is available for installation of non-electronic type trap primer Only. Requires OWNER approval prior to design. For serving single trap only.)

Jay R. Smith MFG. CO.	OR EQUAL

271FM	

2.36 TRENCH DRAINS

A. Schedule Numbers:

TD-1: Pre-sloped, Polypropylene, Polymer Concrete, or stainless steel Trench Drain system, 6" wide.

WATTS	OR EQUAL
Dead Level-D	

1. Grates and Frames:

a. Vandal-proof design and construction.

b. ADA compliant, in conformance to CBC 11B-302.3.

c. Frames shall have concrete anchors appropriate for load rating.

d. Rated for vehicular traffic on areas intended for use by motor vehicles.

e. Hot-dip Galvanized Steel or hot-dip Galvanized Ductile Iron.

2.37 URINALS

A. Schedule Numbers:

U-1: Non-water urinal. Wall-hung vitreous china with replaceable trap cartridge or integral liquid seal trap, provided with a biodegradable liquid seal in compliance with the California Building Code and maintains a sanitary and odor-free environment. Furnish complete with hanger brackets, fasteners, gaskets and drain line connections.

WATERLESS	ZURN	FALCON/SLOAN	KOHLER *	ZERO FLUSH	OR EQUAL
YUKON 2101	Z5795	F1000/ WES-100	K-4919	ZF101	

* Not for kindergarten application

1. Fixtures shall comply with the following requirements:

a. Current versions of ASME A112.19.19, standard for Vitreous China Non-Water Urinals and/or IAPMO IGC 161.

b. Shall meet performance, testing, and labeling requirements for American National Standards Institute (ANSI).

c. Non-water urinals shall hold a current certificate of listing with IAPMO and shall bear the C/IAPMO triangular certification and shall be manufactured in compliance with current IAPMO IGC 161.

2. Trap shall permit the uninhibited flow of waste through the Urinal to the sanitary drainage system.

3. Manufacturers must have a current Los Angeles Unified School District Office of Environmental Health and Safety MSDS approval prior to submittal. The following chemical compounds are currently approved:

   a. Falcon Waterfree Sealant.

   b. Waterless Co. Blue Seal Liquid.

   c. Zurn Aqua Green Sealant.

   d. Kohler Waterless Urinal Sealing Liquid.

   e. Zero Flush Odor Barrier Liquid.

4. Urinals shall at time of school opening be serviced by replacing with an entirely new cartridge and liquid sealant, for units with removable cartridges. All urinals with built in traps shall be rinsed out and liquid sealant replaced.

5. Provide the following replacement quantity based on manufacturer's annual maintenance requirements for each urinal fixture installed:

   a. Falcon Waterfree, four cartridges with liquid trap sealant.

   b. Waterless Co., four cartridges and 78 ounces of liquid trap sealant.

   c. Zurn Waterless, 36 ounces of liquid trap sealant.

   d. Zero Flush, two drain inserts and 24 ounces of liquid trap sealant.

   e. Kohler Waterless, 78 ounces of liquid trap sealant.

6. Training shall consist of two hours of manufacturer certified training for all site-based operations personnel prior to school occupancy. Certificates shall be issued for all personnel who attend the original training session. The plant manager shall be certified as a trainer by the manufacturer. Provide two video tape copies of the original training session.

7. Provide a manufactured supplied "non-water urinal" descriptive placard at each urinal. Mounting heights shall be 48-inch for standard urinals and 42-inch for access compliant urinals.

8. Provide chrome brass flange and chrome brass I.P.S. cap to each urinal water supply line.

9. Provide accessible clean-out above each urinal.

U-2: Same as U-1 with fixture roughed-in at access compliant height.

U-3: Low flush urinal, 1/8 gallon. Wall-hung vitreous china, furnish complete with hanger brackets, fasteners, gaskets and ¾-inch top spud.

1. Bowl:

SLOAN	ZURN	OR EQUAL
SU-1009-STG	Z5755-U	

2. Auto-flush valve (battery): FLV-2.

3. Manual-flush valve: FLV-2a.

U-4: Same as U-3 with fixture roughed-in at access compliant height.

2.38 VACUUM RELIEF VALVES

A. Schedule Numbers:

VRV-1: Lead Free brass body construction with NPT male inlet connection and protective cap. low profile and comply with ANSI Z21.22. Maximum working pressure 200 psi. Install for all tank water heater applications.

WATTS	OR EQUAL
LFN36	

2.39 WATER CLOSETS

A. General: Water closets shall be vitreous china with Polyvinyl chloride bolt caps. Fixtures with auto-flush valves shall be provided with manual override button.

B. Schedule Numbers:

WC-1: Floor-mounted, 14 to 15 inch high bowl for Elementary students. Use with flush valve at 1.28 gallons per flush and open front fire retardant white seats, less cover. **(To be specified for Elementary School uses. Non- accessible)**

1. Bowl:

AMERICAN STANDARD	KOHLER	SLOAN	ZURN	OR EQUAL

3451.001	K-96053	ST-2009	Z5655-BWL1	

2. Auto-flush valve (battery): FLV-1.

3. Manual-flush valve: FLV-1a.

4. Seat: White, ring thickness including bumpers shall be one inch.

OLSONITE	BEMIS	CENTOCO	OR EQUAL
10SSCTFR	1955 SSFR	AMFR500STSCCSS	

WC-2: Floor-mounted, 15 inches height to top of seat for Elementary student use, access compliant, with flush valve at 1.28 gallons per flush and open front fire retardant white seats, less cover.

(To be specified for Elementary School uses. Access compliant)

1. Bowl:

AMERICAN STANDARD	ZURN	OR EQUAL
2599.001	Z5654 BWL	

2. Auto-flush valve (battery): FLV-1.

3. Manual-flush valve: FLV-1a.

4. Seat: White, ring thickness including bumpers shall be one inch.

OLSONITE	BEMIS	CENTOCO	OR EQUAL
10SSCTFR	1955 SSFR	AMFR500STSCCSS	

WC-3: Floor-mounted, 15 to 17 inches height to top of seat for secondary school students and adult use, with flush valve at 1.28 gallons per flush and open front fire retardant white seats.

(To be specified for non-accessible use for Secondary School students and adults use)

1. Bowl:

AMERICAN STANDARD	KOHLER	SLOAN	ZURN	OR EQUAL
3451.001	K-96053	ST-2009	Z5655-BWL1	

2. Auto-flush valve (battery): FLV-1.

3. Manual-flush valve: FLV-1a.

4. Seat: White, ring thickness including bumpers shall be one inch.

OLSONITE	BEMIS	CENTOCO	OR EQUAL
10SSCTFR	1955 SSFR	AMFR500STSCCSS	

WC-4: Floor mounted, access compliant, 17 to 19 inches height to top of seat with flush valve at 1.28 gallons per flush and open front, fire retardant seat.

(To be specified for access compliant use in Secondary schools for students and adults use.)

1. Bowl:

AMERICAN STANDARD	KOHLER	SLOAN	ZURN	OR EQUAL
3461.001	K-96057	ST-2029	Z5665-BWL-1	

2. Auto-flush valve (battery): FLV-1.

3. Manual-flush valve: FLV-1a.

4. Seat: White, ring thickness including bumpers shall be one inch.

OLSONITE	BEMIS	CENTOCO	OR EQUAL
10SSCTFR	1955 SSFR	AMFR500STSCCSS	

WC-5: Floor mounted, 11 to 12 inches height to top of seat with flush valve at 1.28 gallons per flush and open front fire-retardant white seats.

(To be specified for Kindergarten age and younger users.)

1. Bowl:

AMERICAN STANDARD	ZURN	Kohler	OR EQUAL
2282.001	Z-5675-BWL	K-96064	

2. Auto-flush valve (battery): FLV-1.

3. Manual-flush valve: FLV-1a.

4. Seat: White, ring thickness including bumpers shall be 1-1/4 inch.

BEMIS	OR EQUAL
BB 955 CT	

WC-6: Wall-hung, with 1.28 gallon/per flush, flush valve and open front fire retardant seat in white, less cover.

(To be specified for use when floor-mounted water closet piping interferes with flooring and inverted elevation is too critical to make connection. Specify Installation at appropriate height for application – see article 2.46 "Height of Fixtures".)

1. Bowl:

AMERICAN STANDARD	KOHLER	SLOAN	ZURN	OR EQUAL
3351.101	K-4325	ST-2459	Z5615-BWL	

2. Auto-flush valve (battery): FLV-1.

3. Manual-flush valve: FLV-1a.

4. Seat: White, ring thickness including bumpers shall be one inch.

OLSONITE	BEMIS	CENTOCO	OR EQUAL
1055CTFR	1955 SSFR	AMFR500STSCCSS	

2.40 WASHING MACHINE OUTLET BOX

A. Schedule Numbers:

WMOB-1: Recessed, fire rated washing machine outlet box. Furnished with top mounted quarter turn ball valves with integral hammer arresters. Box material: White powder coat on cold rolled steel finish & UL listed intumescent pad.

GUY GRAY	OR EQUAL
FRM12SHA	

2.41 WATER TEMPERATURE CONTROLLERS

A. Schedule Numbers:

WTC-1: Remote bulb type, plain steel case, baked enamel finish, glass fronted cover, mercury to mercury switch. 80 degrees F. to 240 degrees F. range of not more than 10 degrees F. differential.

MERCOID	HONEYWELL	JOHNSON CONTROLS	OR EQUAL
DA-4-35	T675A1540	A19 SERIES	

WTC-2: Immersion type, black hard steel case, separate well type, outside adjustment, temperature range 40 degrees to 180 degrees F. range of not more than 10 degrees F. differential.

HONEYWELL	PENN	JOHNSON CONTROLS	OR EQUAL

T-6031D 1007	A19ABC-11	A19 SERIES	

2.42 WATER HEATERS

A. Electric water heaters must meet NAECA energy efficiency requirements. Exceptions: Point-of-use types less than 20 gallons in capacity.

B. Electric water heaters shall be UL tested, approved, and listed.

C. Water heaters shall be of sizes indicated on Drawings and shall be furnished with accessories necessary to provide a complete and satisfactory piece of equipment.

D. Electric water heaters shall be certified by the California Energy Commission.

E. Proper label of approval and manufacturer name, model number, size in gallons, and rated capacity shall be permanently secured to jacket.

F. Tank type water heaters requirements:

1- Provide separate electrical power circuit breaker.

2- Provide vacuum relief valve.

3- Provide with code required expansion tank by Amtrol. Sized properly per code requirement.

4- Each water heater and expansion tank shall be securely strapped to structure (with straps as required by code).

5- Heaters shall be installed on a minimum 4” maintenance concrete pad poured in place (for central water heaters) with 16 gauge stainless steel drain pan.

6- Heaters shall be furnished complete with brass drain valve system including threaded ball valve and a plug.

7- Install a gate valve on inlet side and union on both inlet and outlet sides of heaters and combination pressure-temperature relief valve piped to an approved receptor on discharge side with minimum code required air gap.

8- Flexible water piping connectors shall not be used.

G. Schedule Numbers:

WH-1: Electric tank type water heaters, 20 to 120-gallon size, shall be provided with a five year unconditional Warranty on tank heater and working parts. Complete warranty for each heater shall be delivered to the Owner’s Authorized Representative (OAR).

(To be specified as central domestic water heating system.)

1. Heater shall be seismically secured with an approved restraint. HOLDRITE QS-50, QS-120.

Model No. as indicated on drawings or equal by:

AMERICAN	BOCK	RHEEM	A.O. SMITH	BRADFORD WHITE	OR EQUAL approved by OWNER

WH-2: Electric Point-of-use tank type water heaters, 6 to 20-gallon size, shall be constructed of galvanized copper-bearing steel and shall be tested at 300 lb. hydraulic pressure. Snap acting thermostat shall be double pole type. Water heater shall be seismically secured and shall not be floor-mounted.

(To be specified as Point-of-use domestic water heating system serving hopper rooms, J buildings, and faculty restrooms.)

RUUD	A.O. SMITH	AMERICAN	OR EQUAL
EGSP	DEL	LDCE31	approved by OWNER

WH-3: Electric Point-of-use tankless type water heaters, shall comply with UL 499 for tankless electric (water heater) heating appliance. Comply with ANSI/NSF 372. Provide a five-year limited leak warranty, covering one year of replacement parts. Electric tankless water heater shall have a maximum operating pressure of 150 PSI. Heater shall be furnished complete with a UL rated cover with manufacturer name and model number permanently secured to the unit. Heating element shall be a replaceable cartridge insert. Unit must turn on at a minimum flow of 0.3 gpm. Provide isolation valves before water heater. Unit shall have Integrated thermostatic mixing valve.

(To be specified for mechanical rooms, single use faculty restrooms, nurses' offices, principal offices, faculty lounge areas.)

Eemax – AccuMix II Series	OR EQUAL approved by OWNER

2.43 WATER HAMMER ARRESTORS

A. Schedule Numbers:

WHA-1: Lead Free Water Hammer Arrestor provided for Headers for Lavatories, Wash Sinks, Wash Fountains, Kitchen Sinks, Service Sinks, Urinals and Water Closets. Also provide for drinking fountains and other fixtures or devices with quick-closing valves, such as clothes washers.

For sizing purposes size according to manufacturer's recommendations.

SIOUX CHIEF	PPP	JR SMITH	WATTS	JOSAM	OR EQUAL

655 and 656 SERIES	SC SERIES	5005 TO 5050 SERIES	Series LF05 and LF15M2	75000	

2.44 WATER TANKS, HOT – UNFIRED

A. Schedule Numbers:

WT-1 Unfired Hot Water Storage Tanks: All welded 1/2 inch thick hot rolled carbon steel plate construction conforming to requirements of ASME Code for Unfired Pressure Vessels (Section VIII of ASME Boiler and Pressure Vessel Code). Tank designed for a working pressure of 125 psig and temperature of 150 degrees F.; tested and coded stamped. Connections shall be 3,000 psi welded extra heavy couplings. Flanged coupling may be furnished on 3 inches or larger connections.

ACE BUEHLER	RAYPAK	A.O. SMITH	OR EQUAL
	LOCHINVAR	BRADFORD/WHITE	

WT-2 Steam-Heated Hot Water Storage Tanks: Same as WT-1, but with addition of heating elements. Heating elements of seamless drawn copper tubing (3/4 inch outside diameter or 1 ¼-inch outside diameter).

ACE BUEHLER	RAYPAK	A.O. SMITH	OR EQUAL

WT-1L: Same as WT-1, but thickness as required by ASME Code for size specified; furnished with not less than 5/8 inch silicon material lining. Lining shall extend into openings so no ferrous metal remains uncovered. Lining shall be guaranteed in writing for a period of 5 years.

WT-2L: Same as WT-2, except lining same as for WT-1L.

2.45 YARD BOXES

A. Schedule Numbers:

YB-1 Yard Boxes: 14 1/2-inch by 19 3/4-inch by 12-inch, cast concrete, with cast iron hinged locking traffic cover marked "GAS"

(For use over gas stops for portable buildings only, on addition to accessible emergency shutoff valve on building.)

BROOKS No. 36-HFL Assembly with cast iron hinged locking cover	OR EQUAL

YB-2: Same as YB-1, marked "WATER" **(For use over water valves)**.

BROOKS No. 36-HFL Assembly with cast iron hinged	OR EQUAL

locking cover	

YB-3: Same as YB-1, marked "SEWER"

BROOKS No. 36-HFL Assembly with cast iron hinged locking cover	OR EQUAL

2.46 UTILITY PROTECTIVE ENCLOSURES

A. Expanded-Metal Enclosures:

1. Description: Enclosure designed to protect aboveground utility equipment, or specialties from damage.

   a. Material: ASTM F 1267, expanded metal side and top panels, of weight and with reinforcement of same metal at edges as required for rigidity.

   b. Type: 304 Stainless Steel size: 1 ½-inch #9 flattened.

   c. Class: uncoated carbon steel Size: 1 ½-inch #9 flattened

   d. Finish :For both carbon Steel & Stainless-Steel surface preparation Abrasive Blasted to SSPC-5 white metal blast with 2-3 mills anchor profile achieved with GMA 60 grit Red Garnet Carbon Steel fixture after blasting to be preheated to 300 degrees for applying Zinc Rich Epoxy primer 2-3 mills thick followed by topcoat Polyester Polyurethane gloss smooth coating Anti-Graffiti, super duty coat by Cardinal industrial finishes to have a total of 5-6 mills DFT. Stainless Steel fixture after blasting to receive 2-3 mills DFT of same super duty Cardinal industrial finishes.

   e. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.

   f. Locking device. To have recessed abundant area for padlock install & removal but having 3/8-inch thick and 2-inch wide SS lock guard.

   g. Lugs or devices for securing enclosure to base all to be INTERIOR. And embed into concrete reinforced slab minimum 4-inch thick and 6-inch in distance all around the perimeter size of enclosure.

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

   a. Placer Waterworks Inc.

   b. Or equal.

B. Enclosure Bases:

1. Description: 6-inch minimum thickness precast concrete of dimensions required to extend at least 6 inches beyond edges of enclosure housings. Include openings for piping that has been wrapped in protection min. of ½" beyond the wall of pipe.

2.47 FIXTURE CONNECTIONS

A. Branches to individual fixtures shall be of the following sizes (Inches) unless larger sizes are indicated on Drawings:

Fixture	Copper, Cold (Inches)	Copper, Hot (Inches)	Trap and Connections (Inches)	Soil/ Waste (Inches)	Vent (Inches)
WC Flush Valve	1	N/A	4	4	2
Lavatories	1/2	1/2	1-1/2 by 1-1/4	2	1-1/2
Service Sink	1/2	1/2	2	2	1-1/2
Kitchen Sink	1/2	1/2	1-1/2 by 1-1/2	2	1-1/2
Classroom Sink	1/2	1/2	1-1/2 by 1-1/2	2	1-1/2
Wash Sink	3/4	1/2	1-1/2 by 1-1/2	2	1-1/2
Multiple Drinking Fountains		N/A	1-1/2 by 1-1/2	2	1-1/2
Single Drinking Fountains	1/2	N/A	1-1/2	2	1-1/2
Individual Showers		1/2	2	2	2
Standard Urinals, Wall-Hung Flush Valve:		N/A	N/A	2	1-1/2

Access Compliant Urinals, Wall-Hung Flush Valve:		N/A	N/A	2	1-1/2
Sillcocks	3/4 minimum	N/A	N/A	N/A	N/A

B. Water headers serving water closets shall be copper water tube, with following size throughout length:

1. 1-1/2 inches for 2 flush valves.

2. 2 inches for 3 to 9 flush valves.

C. Water headers serving urinals shall be of following size throughout length:

1. 1” for 1 or 2 flush valves.

2. 1-1/4” for 3 flush valves.

3. 1-1/2” for 4 to 8 flush valves.

D. Water headers serving showers shall be same as listed above for urinals.

E. Water headers serving lavatories shall be of following size throughout length:

1. 1/2 inch for 2 lavatories.

2. 3/4 inch for 3 and 4 lavatories.

3. One inch for 5 and 6 lavatories.

4. Refer to 2.02.E for fixture supplies.

2.48 HEIGHT OF FIXTURES

A. Heights for standard fixtures.

Fixture	Adults and Students Ages 12 and Over (Inches)	Elementary Ages 6 to 11 (Inches)	Kindergarten and Younger Ages 3 to 5 (Inches)
Toilets, height to top of seat	15 to 17	15	11 to 12
Lavatories, sink top height	32	30	25

Wash Sinks	30	28	24
Urinals, lip height	24	18	N/A
Shower Heads From tip of shower head to finish floor	72		
Shower valves	48		

B. Heights for access compliant fixtures.

Fixture	Adults and Students Ages 12 and Over (Inches)	Elementary Ages 6 to 11 (Inches)	Kindergarten and Younger Ages 3 to 5 (Inches)
Toilets, center line from wall/partition	17-1/2	15	12
Toilets Seat Height	18	15	12
Lavatories, sink top height	34 maximum	30	24 maximum
Lavatories, sink knee clearance	27 minimum	24 minimum	Parallel (Side) Approach
Urinals, lip height	16	15 maximum	13 maximum
Urinals, flush handle height	43	40 maximum	32 maximum
Drinking fountains, bubbler height.	36 maximum	30 maximum	30 maximum
Drinking fountains, knee clearance	27 minimum	24 minimum – not required	24 minimum – not required
Wash Sink	Per Drawings		
Shower Valves	Per CBC		
Shower Seat	Per CBC	Per CBC	Per CBC
Shower Head (adjustable) Bar	Per CBC		

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which Work of this section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:

1. Unless otherwise specified, plumbing fixtures, equipment and appliances that require connections to plumbing line shall be connected. This shall include fixtures specified or indicated as furnished by others, furnished by Owner, or specified in other related sections. Install supplies, stops, valves, traps, wall flanges, or pipe casing for connection of this equipment.

2. Install equipment as indicated on reviewed and accepted Shop Drawings.

3. Avoid interference with Work of other trades. Do not deviate from Drawings without review of the Architect.

B. Examination: Check each piece of equipment in system for defects verifying that parts are properly furnished and installed.

C. For piping Work, refer to Section 22 0513: Basic Plumbing Materials and Methods.

D. Plumbing Fixture and Equipment Installation:

1. Unless otherwise indicated, fixtures shall be installed with 5/16 inch brass bolts or screws of sufficient length to securely fasten fixture to backing, wall, or closet ring.

2. Fixtures installed against concrete or masonry walls shall have their hangers fastened with 5/16 inch brass bolts, Philip Shield type anchors, or 2 unit cinch anchors. Wood or plastic plugs are not permitted.

3. Fixtures installed against wood or metal stud walls shall have their hangers fastened to metal backing plates with 5/16 inch brass bolts screwed into plate. Fixture hangers for urinals shall be fastened centered vertically on metal backing plate with three 5/16 brass bolts each for small individual hangers and six, for larger one piece hangers. Lavatories shall be hung with not less than four 5/16 inch brass bolts or not less than five 1/4 inch brass bolts. Each sink hanger shall be hung with not less than four 5/16 inch brass bolt or not less than five 1/4 inch brass bolts.

4. Pan type drinking fountains shall be hung with 5/16 inch cadmium plated bolts with a bolt in each bolt opening in hanger. Hangers for pan type drinking fountains shall provide 2 inches (plus or minus 1/4 inch) between pan and wall. Spaces due to irregularities between fixtures and tile walls shall be neatly filled with white cement or silicone filler.

5. Backing for hanging of plumbing fixtures and equipment shall be installed in supporting wall at time rough piping is installed. Backing for stud walls shall be steel plate 1/4 inch thick, not less than 4 inches wide. Backing for urinals shall be ¼-inches thick by 6-inch wide steel plate. Steel plate shall be attached to stud at each end of plate and to each stud it crosses. Plate shall be attached to metal studs by bolting with two ¼ inch U-bolts per stud with bolts through plate and around stud flange or by welding with a 1/8 inch fillet weld full width of stud flange, top and bottom of plate. At wood studs, plate shall be carefully recessed flush with face of stud and attached to each stud with 2 No. 14 flat-head wood screws, 2 inches in length into pre-drilled 1/8 inch holes. Backing for stud walls supporting wall-hung closets shall be as detailed.

6. Rough-in for fixtures, equipment and appliances shall be as indicated on Drawings and as specified, including those items indicated as furnished by others, furnished by Owner, or future capacity. When connections to equipment from capped or plugged lines are required, caps or plugs shall be removed at time equipment is set and stops or valves installed and connections provided as specified.

7. Piping shall be stubbed out to exact location of fixtures and stubs shall be installed symmetrical with fixtures. Hot and cold water supplies for center set faucets on lavatories shall be installed on 8-inch centers, unless otherwise specified or required.

8. Kitchen equipment requiring backflow protection with hot and cold water connections shall be installed with approved backflow prevention assemblies; BPV-3 and drain into floor sink with air gap.

E. Cleanouts in Drain, Waste, Vent and Sewer Lines:

1. Cleanouts shall be installed at locations stated in the California Plumbing Code and accessible at following locations:

a. At locations above first floor as stated on construction documents and 5 feet outside of the building.

b. Install an accessible main line upper terminal cleanout in all restrooms above water closet overflow. (Install above upper terminal water closet where there are more than one water closets in a restroom).

c. Above faucets of each sink with brass plug.

d. Above service sink with brass plug.

e. At each Drinking Fountain with brass plug.

f. At each urinal and locate above urinal with brass plug.

g. Above overflow level of pot sinks with brass plug.

h. In vertical line at base of each downspout connected to an underground storm drain system extend cleanout to exterior of building.

i. At upper end of a horizontal vent line when any part of horizontal line is below overflow level of fixture it serves.

j. Not to exceed 100-foot intervals in sewer and waste lines exterior of building.

k. At property line connection.

l. Where indicated on Drawings.

2. Cleanouts shall be extended to grade as follows:

a. Not to exceed 100-foot intervals in straight runs of pipe outside buildings.

b. At horizontal changes of direction in aggregate greater than 135 degrees (underground).

c. At property lines.

d. Where cleanouts occur under concrete.

e. Where marked for future connections.

3. Cleanouts in building shall be extended to floor level or above floor level or above floor level in walls or furring when cleanouts are not accessible or where clearance is less than 18 inches.

4. Cleanouts in finished areas in building shall be concealed except that cleanouts above service sinks in janitor's rooms or closet, and cleanouts above service sinks or in exposed piping in boiler or heater equipment rooms, may be exposed. Cleanouts for urinals shall be installed above urinal and shall terminate behind an access plate.

5. Cleanouts in floors of covered areas and those extended to grade in concrete areas shall be floor level type with extensions body brass plugs and detachable nickel-bronze or aluminum alloy scoriated.

6. Concealed cleanouts in vertical lines shall be service weight soil cleanout tees with brass plugs and round cover plates unless otherwise specified or indicated. Cleanout shall be extended to finished wall by using all brass running thread couplings to extend plug to finish wall.

7. Cleanouts extended from below floor to a wall or furring or on horizontal lines above floor that terminate at a wall or furring shall be iron body type with brass plugs and round cover plates.

8. Cover plates over cleanouts in painted walls shall be steel, bonderized and prime coated. Cover plates cover cleanouts in tile walls shall be chromium-plated brass or nickel bronze. Plates shall be attached to cleanout plugs with 5/16 inch No. 18 or 1/4 inch No. 20 stainless steel vandal-proof type screws. Plates shall be one inch larger in diameter than fitting opening.

9. Cleanouts at bases of downspouts shall be tapped soil tees with brass plugs as hereinafter specified, full size of line.

10. Cleanouts extended to grade in exterior sewer lines other than floors or concrete areas shall be a cleanout assembly with secured top, extra heavy-duty, adjustable sleeve, cut-off ferrule, countersunk threaded brass plug and scoriated tractor type cover.

11. Other cleanouts shall be iron body type.

12. Cleanout extensions shall be no-hub cast iron soil pipe. Exterior cleanouts, those in concrete excepted, shall terminate in a 14-inch by 6-inch thick concrete block with cleanout assembly and top of block flush with finish grade.

13. Fittings in lines utilized as cleanouts shall be approved soil fittings including no-hub pipe. Tees and crosses in vent headers excepted.

14. Pipe joint compound shall not be installed on cleanout plug. After lines are tested and approved, each cleanout plug shall be removed, greased, and replaced.

3.03 EXCAVATION, TRENCHING AND BACKFILLING

A. Perform trenching, excavation, and backfilling required for Work of this section as specified herein and in Section 31 2323: Excavating, Backfilling, and Compacting for Utilities.

3.04 SERVICE CONNECTIONS

A. Determine exact location of required water, drain, and sewer connections and provide proper connections.

B. Potable water lines shall be purged completely before connecting to sources of water for the Project. Determine quality of water supply before connection.

3.05 WATER HAMMER ARRESTORS

A. Install water hammer arrestors indicated on Drawings and in following locations (only non-ferrous arrestors may be installed in copper water system):

1. Water lines to lavatory headers, water closet and urinal headers, service sinks, kitchen sinks, wash fountains, drinking fountains: between drinking fountain and water filter head assembly, laboratories with medical type faucets and on wash sinks having three or more stations and all other quick closing fixture such as clothes washers, as close to fixture as possible.

2. Between last two fixtures when three or more fixtures, other than those listed in Number 1 above, are served by a common header.

B. When possible, arrestor shall be installed in wall or furring. When arrestor is installed in wall or furring, furnish an access plate large enough to permit removal of arrestor. Access plate shall be a minimum of 2 inches larger in each direction than the arrestor.

C. Fixture water lines shall be provided with mechanical water arrestor hammer dampening devices. Air chambers are not approved.

3.06 CONDENSATE DRAINS - FROM AIR CONDITIONING UNITS

A. Connect drain piping from drain pan of air conditioning unit to condensate disposal location indicated. When coil or unit housing is shock or vibration isolated, connection shall be furnished through a flexible connector not less than 10 inches long. Drain line shall pitch to flow out at not less than one inch in 8 feet. Drain line shall not be reduced smaller than unit outlet connection.

B. Condensate drain piping installed within building whether in air conditioned space or not shall be insulated. Refer to Section 22 0700: Plumbing Insulation, for type of material required.

C. Condensate Trap:

1. A condensate trap shall be installed for each air conditioning coil. Trap shall be assembled from 2 brass ground joint unions: one between A/C unit and inlet of trap, and one at outlet of trap that connects to main drain.

2. Trap configuration shall be per manufacturer's recommendations based on total unit casting static pressure (simulated plugged filter condition), but not less than 3 inch water seal.

3. Running trap design is not permitted.

4. Secondary drain shall not be trapped.

D. Condensate trap shall be checked at equipment operational tests for proper water drainage flow from air conditioning unit. Cooling condensate pan shall be filled with water, filters covered with plastic (plugged filter simulated), unit panels replaced, and

unit motor running at design condition. Pan shall drain without hesitation to bottom of inlet connection. Tests are made prior to installation of ceiling.

E. Secondary Overflow Drain:

1. Drain pan installed underneath air conditioning units in concealed ceiling space or units that incorporate dam fitting shall be furnished with secondary drain piped to outside planter area with outflow location clearly visible.

2. If outside building location is not available or feasible, secondary drains shall be piped to a classroom sink, if sink is not available pipe to a room corner away from cabinets, computers, desks, door ways/entrances or stairs.

3. Secondary vertical pipe that penetrates through suspended ceiling shall be furnished with a coupling or threaded adapter so ceiling tile can be removed without damage.

3.07 CONDENSATE DRAINS - FROM WINDOW TYPE HEAT PUMP AND EXTERIOR WALL MOUNT HEAT PUMP UNITS

A. Whether indicated on Drawings or not, window units and wall mount units without built in bottom drain pan for evaporator and condenser coils shall be provided with galvanized steel condensate pan at bottom of unit with drain line that drains into approved drywell. Install copper or Stainless Steel Type 316L 1/2 inch diameter pipe for window type air conditioners and 3/4 inch diameter pipe for exterior wall-mounted heat pump units.

3.08 MAKE-UP WATER SYSTEMS

A. Provide and connect make-up water systems for equipment in other sections.

3.09 GREASE TRAPS (INTERCEPTORS)

A. Grease traps shall be installed only when required by municipal authority. Grease traps shall be separately vented; fixtures connected to grease traps shall be trapped and vented. When grease traps are installed in concrete boxes, fill spaces between grease traps and concrete boxes with sand and place 2 inches of concrete seal over sand. Concrete seals shall pitch toward grease traps with inner edges flush with top of grease traps. Position openings for ease of cleanout.

3.10 GAS SERVICE

A. Above Grade Service: Pipe shall be steel, hammered, free of dirt and scale, and blown out with oil-free air or nitrogen to a clean, dry condition. Piping shall not be installed in or through a ventilation duct or plenum.

B. Underground Service, Gas approved (yellow) Polyethylene Plastic Pipe: Refer to Section 22 0513: "Basic Plumbing Materials and Methods".

1. Pipes shall be joined with polyethylene fitting and joined together by thermal fusion in accordance with procedures recommended by Polyethylene plastic pipe and fitting manufacturer.

2. Plastic pipe shall be installed not less than 30 inches below grade.

3. Underground Warning Tape shall be installed 12 inches above buried gas piping. Warning tape shall be yellow with caution statement as follows: "CAUTION – BURIED GAS LINE BELOW".

4. Plastic pipe shall not be installed in or under a building or structure. Pipe shall be installed under bituminous surfacing or compacted soil area, free from large stones. Pipe may be installed under sidewalks or driveways, as long as no joint occurs. Pipe installed under paved covered areas wider than 40 feet shall be installed in ventilated conduits extending 2 feet past paving.

5. Pipe shall be installed on a 6 inches deep sand bed. After required pressure-leak test, pipe shall be covered with sand not less than 6 inches thick.

6. Piping shall not support weight of valves, metal fittings or other items. Pipe shall be installed strain free.

7. Plastic pipe fittings shall not be stored or left exposed to sunlight. Pipe in open trenches shall be shielded. A sand envelope of 6 inches minimum shall be placed around pipe, with exception of joints, until inspection by IOR is completed. Protection for pipe shall be provided when necessary to leave pipe exposed overnight.

8. Installer of piping is required to have training and to have attained a certification. Non-trained/Non-certified installer must contact the manufacturer or manufacturer's representative to provide on-site fusion training and certification, prior to work commencement

9. Polyethylene plastic pipe shall connect to a steel epoxy coated anodeless type riser to minimum of 6 inches above grade, when exiting the underground installation and transitioning to steel pipe connection.

10. Where a steel pipe riser passes into a structure or building, a double swing or double-offset joint shall be furnished. Pipe shall pass into structure 6-inches above grade and through a sleeve with a minimum one inch clearance. An isolation valve is required before pipe entering the building.

3.11 CLEANING - PLUMBING PIPING SYSTEMS AND FIXTURES

A. Plumbing lines and fixtures shall be flushed to remove dirt and foreign material until water runs clear and no foreign substance or odor is present. Strainers and screens on faucets shall be removed during this cleaning operation.

B. After satisfactory cleaning of strainer and screen replacements has been witnessed by the Project Inspector, post and maintain signs stating: "CAUTION - Water at this construction project has not yet been certified for human consumption." Signs shall be furnished with letters at least 1/2 inch in height and shall be conspicuously posted at entrances to the Project site. Signs shall be paneled, black and yellow, in conformance with OSHA Section 1910.1455.

3.12 DISINFECTING DOMESTIC WATER PIPING SYSTEMS

A. Newly installed or replaced piping and/or fixtures dispensing potable water, and any additional piping and/or equipment impacting the integrity of this system shall be disinfected and undergo an approved bacteriological analysis before water system is allowed for public use.

B. Disinfection shall commence upon complete installation of all related domestic water systems including fixtures, valves, faucets, water heating systems, etc.

C. Work shall be performed by Technicians Certified by the American Water Works Association (AWWA) and/or the State of California Department Health Services, Grade II Water Treatment Operator Certification or higher issued by the Department of Health Services (DHS) for the State of California. Comply with Title 22, Code of Regulations Division 4, Chapter 13, and Article 2 Operator Certification Grades.

D. Method:

1. A Physical Separation of minimum 6” or Reduced Pressure Backflow assembly shall be installed to protect from cross contamination of the local water purveyor’s meter service supply when at any time there is any type of water connection with the piping to be disinfected (Chlorinated) and the water meter service supply.

2. Install a Chlorination Port including a T fitting and a shut off valve to the proximity of the point of connection at the new piping system.

3. System is to be flushed to remove any materials that may have entered the system.

4. Using a chemical feed metering pump and a chlorine tank, the chlorine solution is injected into the water system.

E. Disinfection and De-chlorination procedure (24 or 3 Hour Contact Time):

1. 24-hour Test Method:

a. Prior to disinfection, post signs on all water outlets of the system to be disinfected. Sign or tags shall read, “Water System Being Chlorinated-“Danger Do Not Drink Water” or similar warning.

b. Piping system shall then be adequately flushed with water to remove any particles and eliminate air pockets.

c. Using the continuous feed method, sodium hypochlorite conforming to ANSI/ AWWA B300 will be injected into the water system at a minimum of 50 PPM. A water flow meter provided by the water treatment technician will be used to determine the rate of injection and a chlorine test kit, Hach or equivalent, will be used to monitor the residual.

d. Chlorine residual test will be taken at all appropriate points and outlets to verify 50 PPM residual levels.

e. The chlorinated system shall be shut down for any use and the chlorinated water shall remain in the water system for retention of 24 hours.

f. After 24 hours, chlorine residual levels will again be tested at various points throughout the system to insure a minimum of 25 PPM residual. If the system has not met the minimum of a 25 PPM residual, the above disinfection process shall be repeated.

g. After satisfactory completion of the residual testing, flush out system until Hach or equivalent test reveal the water outlets have a free chlorine residual concentration less than 0.5 PPM. The procedure shall be in accordance with the AWWA standard C651-05.

h. The OAR may allow temporary use of the water system for construction purposes pending results of the bacteriological test analysis. Sign or Tags shall be left on all outlets stating water system is not safe for consumption until laboratory results are complete and meet these specifications.

2. 3 Hour Test Method:

a. If the water systems must be turned on for use as soon as possible, a 3 hours chlorine contact time to allow for disinfection is permitted with the OAR’s approval.

b. Prior to disinfection, post signs on all water outlets of the system to be disinfected. Sign or tags shall read, “Water System Being Chlorinated-“Danger Do Not Drink Water” or similar warning.

c. Piping system shall be then adequately flushed with water to remove any particles and eliminate air pockets. Using the continuous feed method, sodium hypochlorite conforming to ANSI/ AWWA B300 will be injected into the water system at a minimum of 200 PPM. A water flow meter provided by the water treatment technician will be used to determine the rate of injection and a chlorine test kit, Hach or equivalent, will be used to monitor the residual.

d. Chlorine residual test will be taken at all appropriate points and outlets to verify 200 PPM levels. The chlorinated system shall be shut down for any use and the chlorinated water shall remain in the water system for retention of 3 hours.

e. After satisfactory completion of a 3 hour disinfection period, flush out system until Hach or equivalent test reveal the water outlets have a free chlorine residual concentration less than 0.5 PPM. The procedure shall be in accordance with the AWWA standard C651-05.

f. The OAR may allow temporary use of the water system for construction purposes pending results of the bacteriological test analysis. Sign or Tags shall be left on all outlets stating water system is not safe for consumption until laboratory results are complete and meet these specifications.

F. Bacteriological Test:

1. After final flushing and satisfactory results from the residual free chlorine concentration test, Bacteriological test samples shall be collected. The intent of the following is to provide insurance for an accurate representation to a complete Bacteriological test of the water system. At least two samples shall be taken from each floor of each building.

2. Bacteriological test samples shall be delivered to a State of California Department of Health Services Certified Laboratory to perform qualitative and quantitative bacterial analyses on the water samples for the presence of any Total Coliform bacteria and Plate Count. This count must be less than 500 cfu/mL.

3. The procedure shall be repeated if it shown by bacteriological examination made by an approved agency that the level of Disinfection does not meet these specifications.

4. After satisfactory results for the bacteriological test are provided to the OAR, the physical barrier or temporary reduce pressure back flow devise shall be removed, and the new piping shall be connected to the point of connection. All the connecting piping and fittings shall be disinfected prior to installation. Chlorination Port shall be capped water tight. Warning sign or tags shall be removed.

G. Drinking Fountain and Bottle Filler Lead Test: After installation of Drinking Fountain or Bottle Filler, and successful Bacteriological Test, shut off domestic water supply line feeding the fixture, and inform OAR. OAR will coordinate with the Drinking Water Quality Program (DWQP) Supervisor in local Project Unit and M&O's Plumbing Technical Unit Supervisor to conduct lead detection test and mitigate as necessary. Do not remove related construction warning sign and tags.

3.13 VALVES ON PLUMBING SYSTEM

A. Furnish and install gates, ball, globes, angles, and check valves on plumbing Work at following locations whether indicated on drawings or not.

B. Gate valves shall be installed in yard boxes only.

C. Installation of any ball valve within yard box/in ground is not allowed.

D. Hot and cold valves shall be:

1. Lead free complying with AB1953.

2. Above the ground copper water system, 2-inch and larger, may utilize Victaulic butterfly valves and fittings for their connections. A 2-inch or larger Victaulic valve may be in a wall if an adequately sized access panel is provided for maintenance or removal.

E. Valves shall be accessible and installed within an access panel approximately 3 feet above floor and no more than 7 feet above floor (Maximum two valves within each access panel,) or in a marked yard box to prevent tampering.

1. Immediately after each water meter, in addition to any valve furnished by utility company, there shall be an accessible valve on the inlet side for a strainer assembly, dual backflow device assembly and/or possibly a dual pressure reducing valve assembly.

2. A gate valve on each water supply before it enters building. Valves shall be accessible from outside building and shall be installed in a marked yard box, unless otherwise indicated on drawings. Shall omit gate valve handle and furnish 2-inch square operating nut.

3. At multi story buildings, provide an isolation-valve or multiple valves for both hot and cold water in access panel to isolate and control each floor level.

4. For classrooms, shops, offices and boiler or mechanical room, install a gate or ball valve to control hot and cold water lines to each group of fixtures, a group of fixtures shall be considered to be 2 or more fixtures in the same room. When practical, valves shall be installed on the same wall as group of fixtures. Valves shall control only fixtures in rooms in which they are installed.

5. For restrooms, a gate or ball valve shall be installed in each restroom to isolate the hot and cold water supply into a restroom regardless of the number of fixtures. These valves shall control and be accessible only from within the restroom in which fixtures are installed. Valves shall be installed on the same wall as the group of fixtures it serves. Valves shall control only fixtures in restroom in which they are installed. Back to back restrooms shall be isolated separately and individually.

6. Install a gate or ball valve on each building branch line, which serves two or more fixtures, when these fixtures are not provided with a group isolation valve as specified above. These valves shall be located approximately 3 feet but not more than 7 feet above finish floor.

7. Install a gate, ball valve or partition stop for a drinking fountain or a group of drinking fountains.

8. Install a gate, ball valve or partition stop for hot and cold water supply to plumbing fixtures with no accessible supply stops, such as wall mounted faucets.

9. Install a gate, ball valve or partition stop for stops adjacent to, and controlling water flow to each sill cock and hose bib except as follows:

    a. A sill cock immediately below an exterior drinking fountain may be controlled by the same gate, ball valve or partition stop as drinking fountain.

10. Install a lose key angle stop, on each exposed fixture supply, and for each flush valve unless otherwise specified,

11. Install gate or ball valve at each location where a water line is connected to a piece of equipment other than items mentioned above.

12. Install a check valve on each hot water return line where it connects to a hot water storage tank or a water heater.

13. Handles, hand wheels (including dishwasher fill valve handles) and operating nuts shall be furnished of steel, brass, or cast iron and shall be removable. Unless specified to be loose key type, handles shall be securely fastened to their stems. On exposed outdoor valves, omit operating handles and provide operating nuts.

14. Provide a handle or a key for each five, or fraction thereof, loose key valves, bibs, or stops and deliver them to the project OAR.

3.14 VALVES - GAS SERVICE

A. A gas readily accessible shut-off stop shall be installed on each gas line entering a building immediately prior to the point it enters the building. Unless otherwise specified or indicated, shut-off valves for lines entering a permanent structure, buildings or portable buildings, shall be installed in a vertical riser above grade.

1. Gas shut off valve for portable buildings – In addition to the gas readily accessible shut-off stop specified above, a dedicated Gas shut off valve shall be provided in a marked Yard Box, for each portable building to facilitate relocation/removal of building without the need to shut off gas to entire school.

B. Gas Shut off valve within a building – A gas shut off valve with handles shall be accessible and serviceable within an access panel. Install valve minimum 3 feet above floor but less than 7 feet above floor.

C. In addition to locations specified, gas shut off valve shall be installed at following locations:

1. Install a lubricated plug gas shut off valve on any line connected to gas main or header at master assembly.

2. Install a lubricated plug gas shut off valve before entering any building or structure.

3. Install a gas valve on each outlet, in addition to any gas stop furnished with equipment.

4. Service to laboratory gas cocks shall be furnished with a special precision check valve, located downstream from gas stop servicing room outlet at each laboratory cock. Unless otherwise specified, 1/8-inches bore shall be provided for each outlet cock.

5. Install a gas shut-off valve on each gas line serving 2 or more gas outlets in same room. Service stop shall be installed not more than 7 feet above floor, and shall be in the room it serves.

6. Install a gas shut-off valve on inlet side of each gas pressure regulating valve.

7. Gas shut-off valves to be furnished with equipment.

8. Install gas shut-off valve at not more than 1,000 foot intervals on each gas main.

9. At multi-story buildings, provide gas-shut off valve(s) to isolate and control each floor or level. Install valves in a concealed manner in walls with access panels.

10. Gas shut-off valves in classrooms and locations subject to tampering shall be protected while remaining accessible.

D. When a gas-shut off valve adjacent to gas-fired equipment is indicated in Contract Documents it shall be furnished and installed as part of Work of this section.

E. When electrical wall switches with emergency push button are specified for controlling gas outlets at Laboratory Classrooms, provide main shut-off gas valve with normally closed electric solenoid valve within an accessible access panel.

3.15 ELECTROLYSIS PREVENTION

A. Brass nipples, 6 inches, with recognized brass unions; flanges shall be furnished and installed at locations described herein. Flanges shall be installed with complete insulating component consisting of gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at following locations:

1. Where special applications indicated on Drawings require an insulation flange or brass union, with 6-inch brass nipple to be installed in a condensate line, or steam line, flange insulation shall be of a high temperature type, suitable for continuous operation at temperatures up to 220 degrees F. for condensate and 400 degrees F. for steam.

2. Where steel or cast iron in ground connects to copper or brass piping above ground, transition from steel or cast iron pipe to copper or brass pipe shall be provided in an accessible location.

3. Underground dielectric connections shall be furnished in accessible yard boxes.

4. Above ground dielectric connections shall be exposed; or if in finished rooms shall be located in accessible access boxes.

3.16 UNDERGROUND PIPE MARKERS

A. Pipe markers shall be furnished according to Section 22 0553: “Plumbing Identification”

B. Underground Caution Tape shall be placed 12 to 18 inches above the utility line. The Caution Tape shall be a designated color and marked with the appropriate name for the specific type of utility pipe as follows:

1. Yellow – with the words: CAUTION GAS LINE BELOW

2. Blue – with the words: CAUTION WATER LINE BELOW

3.17 TRENCH DRAINS

Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated on drawings.

3.18 HOT WATER CIRCULATING PUMPS

A. Floor-mounted pumps shall be provided with a 4-inch high concrete base with ½ inch reinforcing bars at 12-inch centers each way and doweled into concrete floor.

B. Piping shall be supported from building structure so as to prevent any strain on pump casing.

C. In-line pumps, unless otherwise specified, shall be centrifugal type with non-overloading characteristics and shall not overload motor above its horsepower rating under operating conditions with ratings based on continuous operation.

D. Centrifugal water pumps shall be rated according to Hydraulic Institute Test Code for Centrifugal Pumps. Pumps shall be furnished with bronze water chamber, bronze impeller and mechanical seal. Rotating parts shall be statically and dynamically balanced.

E. Flanged connections shall be provided on pumps with discharge connections larger than 2 inches. Smaller sizes may be threaded connections.

F. Hot water circulating pumps shall be automatically turned on and off maintaining the specified circulation loop temperature, and automatically turned off during periods of no occupancy or demand, or when the hot water supply system is not operational.

3.19 WATER TEMPERATURE CONTROLLERS

Furnish and install a water temperature controller in hot water line adjacent to, and for control of, circulating pumps on hot water return lines when said pump is indicated on Drawings or herein specified. Water temperature sensors may be of the wet-bulb capillary design, or electric thermistor or RTD temperature sensors, installed per the manufacturer’s installation instructions, and protected from accidental damage during routine operations or maintenance.

A. Furnish and install a water temperature controller in hot water storage tanks for control of circulating pump on hot water circulating line when said pump is indicated on Drawings or specified herein.

3.20 COMPRESSED AIR SYSTEMS

A. Compressed air systems including compressors, air line filters, receivers, piping and appurtenances shall be installed as indicated and specified.

B. Component parts of compressor unit shall be installed on a base firmly attached to receiver; motor and compressor shall be properly aligned auxiliary equipment and controls specified, furnished with necessary controls, automatic moisture eliminator fittings, piping, conduits and wiring properly installed and connected in a professional manner. Lubricant shall be furnished to fill until ready for operation. Safety valves

shall be installed to permit normal operation and properly protect equipment. Thermal units shall be installed in motor starter to trip at 125 percent of motor nameplate rating. Pressure switches shall be installed to cut in and cut out of settings indicated.

C. Compressor shall be installed on vibration dampers and flexible connections installed in piping to isolate vibration. Dampers shall be furnished with transmissibility of less than 10 percent for grade installation and less than 5 percent for above grade floor installation.

D. Furnished compressed air system shall comply with safety orders of Industrial Accident Commission of State of California, Building and Safety Department of City of Los Angeles, and electrical units shall be listed as UL approved. Piping between first downstream moisture eliminator and receiver shall pitch down to receiver and shall be not less than one pipe size larger than pipe leaving eliminator. Provide drip points at each building with piping pitching down to them. Drip leg at each drip point and moisture eliminator shall be not less than 6 inches long, capped 1 ½-inch pipe with drain petcock. Upon completion of compressed air piping installation and prior to testing of pipe and final connection to compressed air receivers, systems shall be blown out to a clean, dry condition.

3.21 DEPTH OF SEWER LINES

A. Minimum depth of below grade sewer lines shall be 24 inches to centerline of pipe. Sewer lines shall slope ¼ inch per foot minimum, unless otherwise indicated. Minimum depth at Owner property line shall be 6 feet, unless otherwise required.

3.22 BACKFLOW PREVENTION DEVICES

A. Backflow Devices: Installation of backflow devices shall be tested and certified by Los Angeles County backflow device tester before Substantial Completion. Tests shall be performed in presence of Project Inspector. Test reports shall be turned over to Project Inspector for mailing to proper agency.

3.23 EXPANDED METAL PROTECTIVE ENCLOSURE INSTALLATION

A. Install concrete base level and with top approximately 2 inches above grade.

B. Install protective enclosure over valves and equipment.

C. Anchor protective enclosure to concrete base.

3.24 PEDESTAL DRINKING FOUNTAINS

A. Tailpiece material: copper DWV pipe and fittings.

B. Install clean-out fitting on the vertical part of the tailpiece for future maintenance.

3.25 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose from the project site.

3.26 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION