



Fresno Unified
School District

Ahwahnee Middle School Infrastructure Replacement Technical Specifications

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SECTION 220000
GENERAL MECHANICAL AND PLUMBING

PART 1 - GENERAL

1.1 WORK INCLUDED:

- A. This division requires the furnishing and installation of items specified or indicated on the drawing or reasonably inferred there from, including every article, device or accessory necessary to facilitate each system's functioning as a complete and lawful system.
- B. General Requirements, Division 01 of the Specifications, pertains to and is hereby made a part of Divisions 22 and 23. Contractor is to review the conditions and requirements of Division 1, including Sections on submittals and job site conditions and procedures.
- C. Electrical power and control wiring 50 volts and greater, motor starters, and disconnects are included in FACILITY SERVICES SUBGROUP, unless otherwise noted.

1.2 SCOPE OF WORK:

- A. This work shall consist of, but not be limited to, the following: Furnish and install plumbing fixtures and piping as shown for a complete and functioning system; and furnish and install chiller, boilers, unit ventilators, fans, controls, ductwork, grilles, flex duct and dampers as shown for a complete and functioning system. Prior to fabrication of ductwork, contractor shall verify clearances to determine if structural or other trades have infringed on the space allotted for mechanical equipment. If interferences occur, notify the General Contractor, District and the Architect or Mechanical Engineer.

1.3 FEES AND PERMITS:

- A. The contractor shall secure all permits, licenses, and inspections required for this work as outlined in Division 01.

1.4 CODES AND REGULATIONS:

- A. All work and materials shall be in accordance with the following codes as adopted and amended by the authority having jurisdiction. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. Should the drawings or specifications call for material or methods of construction of a higher quality or standard than required by these codes, the specifications shall govern.
 - 1. California Code of Regulations:
 - a. Title 8, Industrial Relations.
 - b. Title 19, Public Safety.
 - c. Title 20, Building Standards.

- d. Title 24, Building Standards.
2. California Building Code.
3. California Mechanical Code.
4. California Plumbing Code.
5. Standards and regulations of other agencies or organizations, as listed in this specification relating to products or procedures. For example, American National Standards Institute, American Society for Testing and Materials, American Society of Mechanical Engineers, etc.

1.5 GUARANTEE:

- A. Guarantee shall be in accordance with the General Conditions. These specifications may extend the period of guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the certificate of guarantee shall be furnished to District per Specification Section – GUARANTEES.

1.6 DRAWINGS:

- A. Layout of equipment and systems is generally diagrammatic, unless specifically dimensioned. Drawings shall be checked for interferences with structural or other conditions before installing work. Interferences shall be called to the attention of the District.

1.7 DEFINITIONS:

- A. Piping: The term piping shall mean all pipe, fittings, valves, insulation and accessories as required for a complete piping system.
- B. Agencies and Organizations:
 1. AABC - Associated Air Balance Council
 2. AAR - Association of American Railroads
 3. AGA - American Gas Association
 4. AMCA - American Moving and Conditioning Association
 5. ANSI - American National Standards Institute
 6. ARI - Air Conditioning and Refrigeration Institute
 7. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
 8. ASME - American Society of Mechanical Engineers
 9. ASTM - American Society for Testing and Materials
 10. AWWA - American Water Works Association
 11. AAPMO - International Association of Plumbing and Mechanical Officials
 12. NEMA - National Electrical Manufacturers' Association
 13. NEBB - National Environmental Balancing Bureau
 14. NFPA - National Fire Protection Association
 15. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
 16. UL - Underwriters' Laboratories

PART 2 - PRODUCTS:

2.1 QUALITY STANDARDS OF MATERIALS:

- A. The listing of product manufacturers in the various sections of the specifications and drawings is intended to establish a standard of quality only. It is not the intent of the Engineer to discriminate against any material or product that is equivalent, in the opinion of the Engineer, to the standards as described in the specifications and drawings, nor is it intended to preclude open competitive bidding.
- B. Products by other manufacturers will be accepted as outlined in Division 1, Specification Section - SUBSTITUTIONS. No products will be reviewed less than 10 days prior to bid date.
- C. The contractor shall submit to the District copies of complete lists of materials proposed for use, giving manufacturer's name and catalog numbers. Complete shop drawings shall follow for all equipment and fixtures. Shop drawings shall include dimensions, capacities, performance curves and other characteristics as listed in product specifications. Material or equipment shall not be ordered until a written reply is received from the District indicating review and approval of the submittals.

PART 3 - EXECUTION

3.1 TESTING AND START-UP:

- A. ~~Refer to Division 01, and individual sections, for requirements for clean-up, testing, balancing and start-up.~~
- B. ~~The HVAC system shall be balanced by a contractor licensed by a nationally recognized air balance certification agency to the to the satisfaction of the District's representative per Specification Section - TESTING, ADJUSTING AND BALANCING.~~
- C. The piping systems shall be tested in accordance with the California Plumbing Code. Domestic hot and cold water piping shall be tested at 100 psig air pressure for a period of 2 hours. Gas piping shall be tested at 60 PSIG air pressure for a period of 1 hour. Sewer piping shall be tested with a water column to the height of the highest vent line. There shall be no detectable drop in pressure during the test, except that associated with temperature change. The gauge used shall have a least count of 1 PSIG and a range not greater than 150% of the testing pressure.
- D. Maintenance and operations manuals shall be provided at the conclusion to the project. They are to be loose-leaf vinyl covered binders with the project name displayed on the spine of the book in 1/2" high letters. Indexed tabs shall identify the individual sections. The manuals shall include installation, repair manuals provided by the equipment manufacturers, parts lists, listing of local supplier which carries replacement parts, wiring and control diagrams, air balance report, and other pertinent data. Copies shall be delivered to the Engineer for review prior to submission to the District as outlined in Division 1.
- E. Verbal: The Contractor shall also verbally instruct the District's maintenance staff in the operation and maintenance of all equipment and systems.

SPECIFICATIONS

3.2 WORKMANSHIP:

- A. All work done under this Division shall be the highest quality for the trade. Ductwork and piping shall be parallel to building lines. Exposed work shall be properly finished to reflect pride in workmanship.

3.3 SITE VISITATION:

- A. Prior to bidding this project, the contractor shall visit the site and become familiar with the site conditions. The contractor shall verify the work to be performed. Failure to visit the site will not be accepted as an excuse for extra compensation for visible obstacles.

END OF SECTION

SECTION 221000 PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Pipe and pipe fittings
 2. Valves
 3. Sanitary sewer piping system
 4. Domestic water piping system
 5. Natural gas piping system
 6. Condensate drain system
 7. Roof drains and downspouts
- B. Related Sections:
1. Specification Section – GAS DISTRIBUTION SYSTEM.
 2. Specification Section – SANITARY SEWER SYSTEM.
 3. Specification Section – EARTHWORK.
 4. Specification Section – EXCAVATING, BACKFILLING, AND COMPACTION FOR UTILITIES.

1.2 REFERENCES

- A. Applicable Standards - The following standards are referenced herein:
1. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings Class 150 NS 300
 2. ANSI/ASME Sec. 9 - Welding and Brazing Qualifications
 3. ANSI/ASTM B32 - Solder Metal
 4. ANSI/ASTM D2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
 5. ANSI/AWS DI.1 - Structural Welding Code.
 6. ASME - Boiler and Pressure Vessel Code.
 7. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
 8. ASTM A74 - Cast Iron Soil Pipe and Fittings.
 9. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.
 10. ASTM B88 - Seamless Copper Water Tube.
 11. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 12. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 13. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).
 14. ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing and Fittings.
 15. ASTM D2683 - Socket-Type Polyethylene Fillings for Outside Diameter-Controlled Polyethylene Pipe.
 16. ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

17. ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
18. ASTM D3033 - Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
19. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and fittings.
20. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
21. AWS A5.8 - Brazing Filler Metal.
22. AWWA C601 - Standard Methods for the Examination of Water and Waste Water.
23. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.

1.3 SUBMITTALS

- A. General - Submit listed submittals in accordance with Fresno Unified School District's General Requirements, Specification Section -SUBMITTAL PROCEDURES.
- B. Product Data – Submit product data including manufacturer's specifications and general recommendations for pipe materials, pipe fittings, valves, and accessories.

1.4 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body. Valves shall be manufactured in the USA.
- B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.
- C. Welders Certification: In accordance with ANSI/ASME Sec 9, ANSI/AWS D1.1.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver material to job-site in new, dry, unopened, and well-marked containers showing product and manufacturer's name. Deliver material in sufficient quantity to allow continuity of work. Deliver and store valves in shipping containers with labeling in place.
- B. Storage: No material may be stored uncovered in the open or in contact with the ground.
- C. Handling: Material handling equipment shall be selected and operated so as not to damage equipment or existing construction. Handle material to prevent damage during transportation and installation.
- D. The Contractor shall assume full responsibility for the protection and safekeeping of products stored on premises.

2.1 SANITARY AND STORM SEWER PIPING

A. Buried beyond 5 feet of Building:

1. Cast Iron Pipe: ASTM A74, service weight. Fittings: Cast iron. Joints: ASTM C564, neoprene gasketing system or lead and oakum.
2. PVC Pipe: ASTM D3033 or D3034, SDR 35. Fittings: PVC. Joints: ASTM F477, elastomeric gaskets.
3. Changes of direction of sanitary/storm drainage and vent piping shall be by the appropriate use of approved fittings and shall be of angles presented by a 1/16 bend, 1/8 bend, 1/6 bend, combination wye and 1/8 bend, or drainage sweep.

B. Buried within 5 feet of Building:

1. Cast Iron Pipe: ASTM A74 service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets.
2. Cast Iron Pipe: CISPI 301, hubless, service weight. Fittings: Cast iron. Joints: Neoprene gaskets and stainless steel clamp- and-shield assemblies.
3. Changes of direction of sanitary/storm drainage and vent piping shall be by the appropriate use of approved fittings and shall be of angles presented by a 1/16 bend, 1/8 bend, 1/6 bend, combination wye and 1/8 bend, or drainage sweep.

C. Above Grade:

1. Cast Iron Pipe: ASTM A74, service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets.
2. Cast Iron Pipe: CISPI 301, hubless, service weight. Fittings: Cast iron. Joints: Neoprene gaskets and stainless steel clamp- and-shield assemblies.
3. Changes of direction of sanitary/storm drainage piping shall be by the appropriate use of approved fittings and shall be of angles presented by a 1/16 bend, 1/8 bend, 1/6 bend, combination wye and 1/8 bend, or drainage sweep.

2.2 WATER PIPING

A. Buried beyond 5 feet of Building:

1. Galvanized Steel Pipe: ASTM A53 or A120, Schedule 40. Fittings: Cast iron. Joints: Threaded galvanized malleable fittings. Covering: 40 mil polyethylene similar to "X-Tru-Coat".
2. Copper tubing: ASTM B88, Type K, hard drawn. Fittings: ANSI/ASME B16.29, wrought copper. Joints: AWS A5.8, BCuP silver braze.
3. PVC Pipe: Schedule 80, AWWA C900 – ASTM D1785, ASTM D2241, Fittings: ASTM D2464, ASTM D 2466, ASTM D 2467, ASTM F1970.

B. Buried within 5 feet of Building:

1. Galvanized Steel Pipe: ASTM A53 or A120, Schedule 40. Fittings: Cast iron. Joint Threaded galvanized malleable fittings. Covering: 40 mil polyethylene similar to "X-Tru-Coat".
2. Copper Tubing: ASTM B88, Type K. Fittings: ANSI/ASME B16.29, wrought copper. Joints: AWS A5.8, BCuP silver braze.

2.3 WATER PIPING AND CONDENSATE DRAINS

A. Above Grade:

1. Copper Tubing: ASTM B88, Type L. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: AWS A5.8, BCuP silver braze.
2. Galvanized Steel Pipe: ASTM A53 or A120, Schedule 40. Fittings: Cast iron. Joints: Threaded galvanized malleable fittings.
3. PVC Pipe-Condensate drains are not allowed. Condensate drains shall be copper or steel as defined in Paragraphs 1 and 2 above.
4. PVC Schedule 80 Pipe and Fitting: ASTM D1785, may be used on roofs.

2.4 NATURAL GAS PIPING

A. Buried beyond 5 feet of Building:

1. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ASTM A234, forged steel welding type, with ANSI/AWWA C105 polyethylene jacket equivalent to "X-TRU-COAT". Joints: ANSI/AWS D1.1, welded.
2. Polyethylene Pipe: ASTM D2513, SDR 11.5. Fittings: ASTM D2683 or ASTM D2513 socket type. Joints: Fusion welded.

B. Buried within five feet of Building:

1. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ASTM A234, forged steel welding type, with ANSI/AWWA C105 polyethylene jacket equivalent to "X-TRU-Coat". Joints: ANSI/AWS D1.1, welded.

C. Above Grade:

1. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ANSI/ASME B 16.3, malleable iron, or ASTM A234, forged steel welding type. Joints: Screwed for pipe two inches and under; ANSI/AWS D1.1, welded, for pipe over two inches.

2.5 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size Two Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, brazed joints.

B. Pipe Size Over Two Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service; 1/16-inch thick preformed neoprene bonded to fibrous material.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.6 VALVES

A. Gate Valves:

1. Up to 2" Inches: Threaded or soldered, lead-free, bronze body, non-rising stem, malleable iron hand wheel w/ stainless steel nut. Nibco T-113 or equal.
 2. Over 2" Inches: Flanged, lead-free, ductile iron body, resilient wedge non-rising stem w/ 2" operating nut below grade or hand wheel above grade.
- B. Globe Valves:
1. Up to Two Inches: Bronze body, rising stem and handwheel, inside screw, renewable composition disc, screwed ends, with backseating capacity.
 2. Over Two Inches: Iron body, bronze trim, rising stem and handwheel, OS&Y, plug-type disc, flanged ends.
- C. Ball Valves:
1. Up to Two Inches: Bronze body, stainless steel ball, Teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.
 2. Over Two Inches: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged.
- D. Gas Cocks:
1. Up to Two Inches: Bronze body, bronze tapered plug. non-lubricated, Teflon packing, threaded ends.
 2. Over Two Inches: Cast iron body and plug, non-lubricated, tenon packing, flanged ends.
- E. Butterfly Valves:
1. Iron body, bronze disc, resilient replaceable seat for service to 180 degrees F, water or lug ends, 10-position lever handle.
- F. Relief Valves:
1. Bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Visit – Examine areas and conditions under which work of this section shall be performed.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.
- H. Slope water piping and arrange to drain at low points.
- I. Establish elevations of budded piping outside the building to ensure not less than 2 1/2 ft. of cover, unless shown otherwise.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding,
- K. Prepare pipe, fittings, supports, and access doors not prefinished, ready for finish painting.
- L. Establish invert elevations, slopes for drainage to 1/4 inch per foot minimum. Maintain gradients. Notify Engineer if slope cannot be maintained.
- M. Excavate in accordance with Specification Sections in the Facility Construction Subgroup and for work of this Section.
- N. Backfill in accordance with Specification Sections in the Facility Construction Subgroup for work of this Section.
- O. Install bell and spigot pipe with bell end upstream.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Provide one-plug cock wrench for every 10 plug cocks sized two inches and smaller, minimum of one. Provide each plug cock sized 2-1, and larger with a wrench with set screw.
- R. Wrap gas pipe and fittings with a double layer of 10 mil Scotchwrap polyethylene tape with 50% overlap.

3.4 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.

- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- D. Install gate, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install ball or butterfly valves for throttling, bypass, or manual flow control services.

3.5 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C601.

3.6 SERVICE CONNECTIONS

- A. Connect to new services as shown on drawings.
- B. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 0.5 inch wg. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.

END OF SECTION

SECTION 312000
EARTHWORK: EXCAVATION, FILLING AND GRADING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

- A. This Section includes the following:

1. Excavating soil and other material for surface improvements.
2. Placing fill.
3. Compaction of existing ground and fill.
4. Preparation of subgrade for other improvements.
5. Grading of soil.

- B. RELATED SECTIONS

1. Contract General Conditions and Division 1, General Requirements
2. Section 31 11 00 – Site Clearing
3. Section 31 22 22 – Soil Materials
4. Section 31 23 33 – Trench Excavation and Backfill

1.3 REFERENCES

- A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- B. Geotechnical Report prepared by Salem Engineering Group, Inc, Project number 1-218-0383, dated by June 1, 2018, and is available for reference only, at the cost of reproduction.

1.4 DEFINITIONS

- A. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.5 SUBMITTALS

- A. Product Data:
 - 1. Information indicating the source of all import material, the fill material type and where it is to be used and approval of the District's Inspector of Record for incorporation of import material into the Work.

- B. Material Test Reports:
 - 1. Classification of Soils.
 - 2. Compaction Characteristics of Soils.
 - 3. Density and Unit Weight of Soils in Place.
 - 4. Import material must be approved by District's inspector, Geotechnical Engineer and the California Department of Toxic Substances Control (DTSC) prior to being brought on site.

- C. Project Closeout: In accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Drawings indicating the extent and depth of all engineered fill, and overexcavation and recompaction. This information shall be a part of the Project "As-Built" and Project "Record" Documents in accordance with the Specification Section PROJECT DOCUMENTS.

1.6 QUALITY ASSURANCE

- A. Installer:
 - 1. Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB].
 - b. CF City of Fresno, Codes and Ordinances
 - c. EPA Environmental Protection Agency.
 - d. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.
 - e. DTSC Comply with all requirements of the California Department of Toxic Substance Control (DTSC) regarding soil testing for potential contaminants.

- C. Certificates:
 - 1. Installer's certification that all Earthwork installation meets or exceeds the requirements of this specification.

2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials and installation meets or exceeds the requirements of this specification.

D. Meetings:

1. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems which may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been filed.

1.7 COORDINATION

- A. Coordinate work with Owner's personnel.
- B. Provide required notification to the Geotechnical Engineer so that a representative from the Owner's Geotechnical Engineering consultant can be present for all excavation, filling and grading operations to test and observe earthwork construction.
- C. Verify that the location of existing utilities have been indicated at work site by utility authorities, by Owner, and as specified on the Plans.

1.8 EXISTING CONDITIONS

- A. Existing Conditions:
 1. Examine the site and verify conditions with the Drawings and Specifications. Contractor shall familiarize himself with existing site conditions and any changes that have occurred at the site since the preparation of the contract documents, and shall be responsible to account for any such changes in the price bid for this work.
 2. Thoroughly investigate and verify conditions under which the Work is to be performed.
 3. Locate and identify utilities:

- a. Call a Local Utility Locator Service (USA - "Underground Service Alert" – [800] 227-2600) for the task of locating any applicable off-site and on-site utilities in the area where the Project is located.
4. No allowance for Extra Work will be granted resulting from negligence or failure to meet requirements of this Section.
- B. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete flatwork, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunk line utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.
- C. Under similar circumstance, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.
- D. Determine exact location of existing buried utilities by:
1. Marking on ground or pavement surface the alignment and extent of the facilities and the probable location of existing utilities using construction plans and existing surface features.
 2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations, and notify Owner of said request concurrently.
 3. Confirm exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.
- E. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.
- F. Provide Field Engineering to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under this Contract, submit detailed information to the Engineer for review and direction.
- G. Maintain all existing utility mains and service lines in constant service during construction of the Work.

- H. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work, and coordinate the timing of any such disruptions in advance with the District.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
 - 1. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.
 - 2. All land clearing, demolition, grubbing, scraping, excavation, land leveling, grading, and cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by pre-soaking.
 - 3. When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions or at least six inches of freeboard space from the top of the container shall be maintained.
 - 4. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.
 - 5. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/ suppressant.
 - a. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
 - b. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. If required, Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
 - c. If a dust control plan is required, no construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan.
 - d. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.
 - e. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum

price bid for work under this contract and no additional payment will be made therefore

- B. Burning: No burning will be allowed on-site.
- C. Rain: Work under this section shall not be started or maintained under threat of rain, unless the work is not affected by the rain.
- D. Do not place fill during weather conditions which will alter moisture content of fill materials sufficiently to make compaction to the specified densities difficult or impossible.
- E. When reference is made to SWPPP (Storm Water Pollution Prevention Plan), if any within this Project Manual, then comply with all environmental protection requirements included therein.
- F. In accordance with EPA, CARB and CF.
- G. Protection:
 - 1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of water. Remove seeping water immediately by pumps. Provide dewatering as necessary.
 - 2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
 - 3. Protect utilities to remain within the construction area and special construction. If utility lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during excavation of site, notify the Architect promptly for its review and action.
 - 4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of the limits of grading.

1.10 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of GENERAL CONDITIONS and DIVISION 1, GENERAL REQUIREMENTS.
- B. Accurately record actual locations of utilities encountered including depth and horizontal location, as measured from permanent site features.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill in Turf or Other Planting Areas: Type S2 or S3 per Division 31 Specification Section SOIL MATERIALS.
- B. Fill in Non-planting Areas: Type S1, S2 or S4 per Division 31 Specification Section SOIL MATERIALS.
- C. Imported material: Type S3, S4 or S5 per Division 31 Specification Section SOIL MATERIALS.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions.

3.2 PREPARATION

A. Layout of Work:

1. Contractor shall be responsible for all lines and grades. Layout shall be provided by a California registered Land Surveyor or Civil Engineer, at Contractor's expense.
2. Check all bench marks, monuments and property lines and verify locations.
3. Locate and maintain all grade stakes.
4. Monuments moved or displaced during grading operation are to be replaced by a California Registered Civil Engineer or Surveyor, at Contractor's expense.

- B. Locate, identify, and protect existing above and below grade utilities from damage.

- C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

- D. Protect existing structures, fences, curbs, sidewalks, paving and other improvements to remain from damage from excavation equipment and vehicular traffic. E. Employ equipment and methods appropriate to the work site.

- F. Protect excavated areas from drainage inflow, and provide for drainage of all excavated areas.

- G. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.3 SITE STRIPPING:

- A. Reference is made to Division 31 Specification Section SITE CLEARING.

- B. Within the areas of planned surface improvements and structures, the near surface soils containing vegetation, roots, organics, or other objectionable material must be stripped and removed from the site. Upon approval of the Geotechnical Engineer, suitable materials stripped from the site may stockpiled and incorporated into the finish fill for planting areas.

- C. All areas to receive surface improvements shall be stripped to remove turf, shrubs, trees and other vegetation, along with associated root systems, concrete, wood, metal, rubbish and other unsuitable debris, and any loose, saturated or unconsolidated soil material. Minimum stripping

depth is expected to be 2-inches below existing site grades. Stripping shall continue to the depth required to expose acceptable basement soils that are free from deleterious which are not suitable for Engineered Fill, as required by the Geotechnical Engineer.

3.4 EXCAVATION

- A. Following clearing and stripping operations, excavate planned construction areas as specified in this Section.
- B. Provide additional excavation as required to conform to the lines, grades and cross-sections shown on the plans.
- C. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw. Remove all roots $\frac{1}{4}$ " in diameter and greater.
- D. Remove excess soil not to be used as fill in the Work from the site. Unless requested by Owner to be deposited at a site designated by Owner on the property, obtain a disposal site and legally dispose of said excess material, all at no additional cost to the Owner.
- E. Areas disturbed by demolition must be excavated to expose undisturbed soils.
- F. Excavated soils free of deleterious substances (organic matter, demolition debris, tree roots, etc.) and with less than 3% organic content by weight may be returned to the excavations as Engineered Fill.

3.5 FILLING AND COMPACTING

- A. Once clearing, stripping and over-excavation operations are complete, scarify the surface to receive fill material or improvements to a depth of 8-inches, moisture condition to at least 2% above optimum moisture content, and compact to a minimum of 92% of maximum dry density based on ASTM Test Method 1557.
- B. Place and compact soil to finish subgrade of improvements to be placed thereon, or to finished surface grade where no improvements are to be placed thereon. C. All fill required shall be placed as Engineered Fill.
- D. Imported fill shall be approved by the Geotechnical Engineer prior to placement
- E. On-site soils are suitable for re-use as Engineered Fill, providing they are cleansed of excessive organics (less than 3 percent by weight, ASTM D2974), debris, and fragments larger than three (3) inches in maximum dimension and meet the requirements of soil Type S4, Division 31 Specification Section SOIL MATERIALS.

- F. Engineered Fill shall be moisture conditioned to within 2% of optimum moisture, placed in uncompacted layers not exceeding eight (8) inches in thickness, and compacted as specified, based on ASTM Test Method D1557.
 - 1. Non-vegetative surface improvement areas (structures, pavement and site concrete improvements) - To a minimum of 92% of maximum dry density.
 - 2. Vegetative surface improvement areas (turf and planters) - Below top twelve (12) inches - to a minimum of 90% of maximum dry density. Top twelve (12) inches - 85% of maximum dry density.
- G. Maintain optimum moisture content of fill materials to attain required compaction density.
- H. Additional lifts shall not be placed if the previous lift did not meet the required dry density, or if soil conditions are not stable.
- I. Conform fill to the lines, grades and cross-sections shown on the plans.
- J. Fill materials to conform to Division 31 Specification Section SOIL MATERIALS.
- K. Provide, at no additional cost to Owner, imported soil material conforming to the requirements of Division 31 Specification Section SOIL MATERIALS, as needed to attain finished grades of Work.
- L. Utilize equipment which will not disturb or damage existing utilities and other improvements.

3.6 PREPARATION OF SUBGRADE FOR SURFACE IMPROVEMENTS

- A. Where concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvements, or a layer of said surface improvements, are to be constructed on the soil surface, prepare the subgrade for said improvements in accordance with this section.
- B. Scarify the soil as specified and remove and dispose of (off the project site) all rocks, hardpan chunks or otherwise unsuitable material over 2 ½ inches in size.
- C. Thoroughly moisture condition and compact as described above.
- D. Prior to commencing construction of surface improvements, pass a test roller of size and weight as approved by the Owner over the subgrade to establish the extent of soft or spongy areas requiring repairs.
- E. Conform finished subgrade surface to the lines, grades and cross-sections shown on the plans.

3.7 FINE GRADING

- A. Fine grade all finished surfaces to the lines, grades and cross-sections shown on the plans, and to blend to hard surface improvements.

- B. Rake and smooth all finished surfaces not to receive hard surface improvements.
- C. Use suitable stockpiled or imported topsoil for the top 12-inches of areas to receive landscape improvements.
- D. Import topsoil meeting the requirements of Division 31 Specification Section SOIL MATERIALS, as required to complete finish grading.
- E. Topsoil may not be used in areas requiring Engineered Fill.

3.8 TOLERANCES

- A. Top surface of Subgrade for Non-Vegetative Surface Improvements or Layers thereof: Plus or minus 0.02 foot from planned elevation.
- B. Top surface of Subgrade for Vegetative Surface Improvements or for Bare Ground - Plus or minus 0.05 foot of planned elevation, or as required for finish surface to match adjacent improvements or ground.

3.9 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of GENERAL CONDITIONS and/or DIVISION 1, GENERAL REQUIREMENTS.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.
- C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.
- D. All retesting required as a result of failure of initial test will be performed by Owner's testing agency, at the expense of the Contractor.

3.10 PROTECTION

- A. Protect graded areas from traffic, freezing, erosion, and all other sources of damage. Keep free of debris and trash.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed work becomes eroded, rutted, settled, or where it is damaged by subsequent construction operations or weather.
- C. Where settlement occurs prior to acceptance of the work, remove and replace surface improvements, excavate, replace, and re-compact in accordance with these specifications, and restore the surface improvements.

3.11 CLEANING

- A. Remove all surplus or unsatisfactory soil material, trash, and debris, and legally dispose of off of the Owner's property.

END OF SECTION

