

SPECIFICATIONS - DETAILED PROVISIONS
Section 02201 - Construction Methods & Earthwork

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SECTION 02201
CONSTRUCTION METHODS & EARTHWORK

PART 1 - GENERAL

1.01 REQUIREMENT

A. Verification of Existing Conditions

It shall be the responsibility of the Contractor to examine the site of the work and to make all investigation necessary, both surface and sub-surface, to determine the character of materials to be encountered and all other existing conditions affecting the work.

B. Site Grading

The entire site within the area affected by construction shall be cleared and bladed. All surfaces to receive compacted fill shall be cleared of existing vegetation, debris, or other unsuitable material. Surfaces shall be cut or filled to the extent indicated by finish grade stakes set by the Engineer. Finish surfaces shall slope uniformly between spot elevations or finish contour lines shown on the drawings and away from structures. Subgrade for finished surfaces, concrete, asphalt, etc., the grading tolerance will be plus or minus .05 feet from surface elevations indicated.

Rough Site Grading. All requirements of Site Grading shall be adhered to, with the exception that in unpaved areas and areas which do not have gradient restraints to allow for proper drainage, the grading tolerance will be plus or minus 0.20 feet from surface elevations indicated.

Rough site grading in areas of future pavement shall have grading tolerance of plus or minus 0.10 feet from surface elevations.

C. Lines, Grades and Measures

All lines and grades will be established by the Engineer, and the Contractor shall provide him with such assistance and materials as may be required. The Contractor shall carefully preserve all survey stakes and reference points. SHOULD ANY STAKES OR POINTS BE REMOVED OR DESTROYED BY ANY ACT OF THE CONTRACTOR OR HIS EMPLOYEES THEY MAY BE RESET AT THE CONTRACTOR'S EXPENSE.

All work shall conform to lines, elevations and grades shown on the construction plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variations shall be reported to the District Engineer or Inspector. In the absence of such report, the contractor shall be responsible for any error in the grade of the finished work.

Stakes for video taping of project alignment will be provided by the District at 300' intervals and angle points.

Grade stakes for buildings, sidewalks, pump bases, engine bases, utility services and paving shall be furnished by the Contractor.

Grade stakes for water system construction will be at 100' stations except as directed by the Engineer for specific applications, and at fire hydrant, blow-off, air valve, water meter locations, and valves.

Grade stakes for sewer system construction will be furnished at 25' stations and at locations of appurtenances.

D. Compliance with Regulations

The Contractor shall familiarize himself, and comply with all applicable federal, state, county and municipal rules and regulations pertaining to sanitation, fire protection, and safety.

E. Contractor's Equipment

The Contractor shall provide such modern plant and equipment as may be necessary in the opinion of the Engineer to perform in a satisfactory and acceptable manner, and in accordance with the specifications, all the work required of the Contractor.

F. Representatives for Emergencies

The Contractor shall file with the District a written list giving the names, addresses, and telephone numbers of at least two (2) of his representatives who can be contacted at any time in case of emergency. The representatives shall be fully authorized and equipped to correct unsafe or inconvenient conditions on short notice. The Contractor shall promptly notify the District of all changes in the listing.

G. Power and Water Supply

The Contractor shall provide at his own expense all necessary power required for his operations under the contract. The Contractor shall provide and maintain in good order such modern power equipment as shall be adequate in the opinion of the Engineer to perform in a safe and satisfactory manner the work required by the contract.

The Contractor may obtain water for work under this specification from the sources as stated in the Special Provisions and Requirements of this specification.

A. Contract Drawings

The drawings identify the various pipes, conduits, and other existing utility structures as they are supposed to exist in construction areas, but no error or omission on said drawings shall be construed to relieve the Contractor from the responsibility of protecting any such pipe, conduit, or other existing utility structures.

When deemed necessary by the Engineer, revisions of the contract drawings and additional detailed drawings will be issued to the Contractor during the progress of the work.

B. Notification of Underground Service Alert of Southern California

When performing underground work, the Contractor shall call Underground Service Alert (USA), the one-call underground facility locating service two (2) working days prior to making an excavation. Contractor shall be responsible for such notification of sub-contractor's work, or shall require sub-contractor to assume this responsibility.

C. Operation of Utilities

No District valves or appurtenances of other utility facilities shall be operated by the Contractor without approval and/or instruction from the District or the utility, as appropriate.

D. Maintenance of Utilities

Insofar as practical during the progress of the work, the property of any owner of a public utility pipeline or conduit, sewer, culvert, storm drain, drainage ditch, flood control channel, overhead wires or cables, or underground wires or cables, or any other structure or facility shall not be disturbed but shall be supported and protected against injury and maintained in good operating condition at the expense of the Contractor. In no case shall any such property be disturbed or removed without the consent of the owner and approval of the Engineer. The Contractor shall be responsible for making good all damage due to his operations and the provisions of this section shall not be abated even in the event such damage occurs after backfilling, or is not discovered until after completion of backfilling.

The Contractor shall explore the location and depth of underground facilities, sewers, and storm drains sufficiently in advance of pipe laying or other construction operations so that changes in line or grade, or both, can be made in the pipeline without delay of the Contractor's construction schedule, without relaying or reconstructing previously installed pipe or other facilities and to avoid wherever possible moving, altering, or reconstruction of the obstructing underground facilities, sewers, or storm drains.

The locations of existing underground utilities and structures, insofar as they are known from information furnished by the respective utility companies and agencies and other sources, have been shown on the drawings.

It shall be the responsibility of the Contractor to verify the location of these obstructions and to locate any other underground utilities and structures which might necessitate a change in the line and grade of the new work. If the Contractor, while performing the work of construction, discovers utility facilities not identified by the District in contract plans or specifications, he shall immediately notify the District in writing.

In no case shall any utility that has been damaged, whether shown or not shown on the plans, be backfilled without the Contractor notifying the utility company of the damage.

Pursuant to Section 4215 of the Government Code, the District shall compensate the Contractor for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating main or trunkline utility facilities not indicated in the plans and specifications with reasonable accuracy, and for equipment on the project necessarily idled during such work. The Contractor shall not be assessed liquidated damages for delay in completion of the project, when such delay was caused by the failure of the District or the owner of the utility to provide for said removal or relocation of such utility facilities. Nothing herein shall be deemed to require the District to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the site of the construction.

E. Utility Construction

If the work requires, as shown on the drawings or as specified, or as required for the Contractor's convenience, that the surface and overhead facilities, underground facilities, sewers and storm drains should be moved, altered, relocated, reconstructed, or temporarily supported, in order that the facilities included in the contract can be constructed, the Contractor shall make all arrangements therefore with the respective owners and shall bear all expenses for moving, altering, relocating, or temporarily supporting the facilities.

In addition, the District may require the moving, altering, or reconstructing of obstructing underground facilities, sewers, or storm drains, and compensation therefore will come under extra work where such work is ordered in writing by the Engineer.

Pipelines determined to be abandoned may be destroyed if conflicting with the contract work and properly disposed of. Exposed ends of abandoned pipelines shall be plugged for watertightness as approved by the Engineer.

1.03 JOB CONDITIONS

A. Rights-of-Way

The District will provide right-of-way for the pipelines to be constructed under the contract. Neither the terms hereof nor anything shown on the drawings in connection with the right-of-way provided by the District shall be construed to entitle the Contractor to conduct operations in said right-of-way in violation of any public agency ordinance or regulation restricting interference with water courses and drainage channels, road, alley, or street, until he has obtained permits therefore from the proper authorities.

In all of the streets in which his work may interfere with ingress or egress of the occupants of the abutting property or of their vehicles, the Contractor shall maintain temporary practical means of ingress and egress or shall make satisfactory arrangements with the occupants for the obstructing of ways to their properties for the duration of the interference. Such arrangements shall be made in writing and a copy submitted to the Engineer.

Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street or way during performance of the contract work, and he shall so conduct his operations as not to interfere unnecessarily with the authorized work of other agencies in such streets and ways.

Fences on the right-of-way shall be removed by the Contractor where necessary for the performance of the work, but, where required, shall be maintained until the work is completed or their removal is authorized. Where the Contractor removes existing fences to facilitate the work, temporary fence protection for lands adjacent to the right-of-way shall be provided at all times during the continuation of the contract. Such temporary fence protection shall be adequate to prevent livestock from straying from or onto adjacent lands and shall be constructed complete with gates and/or cattle guards. The cost of all work described in this paragraph shall be included in the prices bid for other items of work and no separate payment shall be made therefore. Where pipelines are to be constructed through and adjacent to tracts of improved property, the Contractor shall, where practical, confine his operations within a 30-foot wide right-of-way or such other width right-of-way as may be designated on the drawings or in the Special Provisions. If the Contractor's operations are such as to require additional space, the Contractor shall arrange for and secure at his own expense any additional right-of-way required. The Contractor shall enter into written agreements with the landowners and copies of the agreements shall be furnished to the Engineer.

Where the pipeline is to be constructed through cultivated fields not in public road rights-of-way, the District will obtain and pay for damage to crops over a total overall width of 30' or such other width as may be designated. Any damage to crops outside of the designated right-of-way shall be paid for by the Contractor.

B. Safeguarding Excavations and Property

Excavations shall be adequately shored and braced so that the earth will not slide or settle and so that all existing improvements of any kind will be fully protected from damage. Any damage resulting from a lack of adequate shoring and bracing shall be the responsibility of the Contractor. The Contractor shall effect all necessary repairs or reconstructions at the Contractor's own expense as directed by the Engineer and shall bear all other expenses resulting from such damage.

C. Safety Measures

Each bid proposal submitted under these specifications for the construction of a pipeline, sewer, sewage disposal system, boring and jacking pits, or similar trenches or open excavations, or the use of such a trench or open excavation, shall include in appropriate bid items for such work the costs necessary to provide adequate sheeting, shoring, and bracing, or equivalent method for the protection of life or limb, which shall conform to applicable safety orders, including the Construction Safety Orders of the California Division of Occupational Safety and Health, in accordance with the requirements of the California Occupational Safety and Health Act.

When working in, or connecting to, existing systems in operation, the required safety provisions for work in an operating system will be enforced, including provisions for working in confined air spaces when appropriate.

Nothing in this requirement shall be construed to impose tort liability on the awarding body or any of its employees.

D. Trench Shoring Approval

Any contract for public works involving an estimated expenditure in excess of twenty-five thousand dollars (\$25,000) for the excavation of any trench or trenches 5' or more in depth, shall require submission by the Contractor and acceptance by the awarding body or by a registered civil or structural engineer to whom authority to accept has been delegated, in advance of excavation, of a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards, the plan shall be prepared by a registered civil or structural engineer.

Nothing in this section shall be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by the Construction Safety Orders.

Nothing in this section shall be construed to impose tort liability on the awarding body or any of its employees.

E. Trench Permit

Prior to commencing any work in the construction or use of trenches or excavations which are 5' or deeper and into which a person will be required to descend, the Contractor shall apply to the California Division of Occupational Safety and Health, and secure a permit therefore, and shall furnish the District with a copy thereof prior to commencing any excavation.

F. Safety Officer

The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of hazards and accidents. This person shall be the Contractor's Superintendent unless otherwise designated in writing by the Contractor to the District.

G. Right to Occupy Completed Portions of Work

The District may wish to occupy or place in service portions of the completed work before final completion of the contract work and shall be at liberty to do so, but such occupancy or placing in service of any completed portion of the work shall not void the contract nor relieve the Contractor of his responsibility of protection and care of all work until final completion and acceptance of the entire work, provided, however, that expense directly attributable to operation and placing in service the portions of the work shall not be chargeable to the Contractor.

1.04 GUARANTEE

The Contractor hereby guarantees that the entire work constructed by him under the contract will fully meet all the requirements thereof as to quality of workmanship, and of materials furnished by him. The Contractor hereby agrees to make at his own expense any repairs or replacements made necessary by defective materials or workmanship supplied by him which have become evident within one (1) year, or other guarantee period elsewhere specified, after date of notice of completion and acceptance of the work is filed, and to restore to full compliance with the requirements of these specifications including the test requirements, any part of the facilities or appurtenant works which during said guarantee period is found to be deficient with respect to any provision of this specification. Replacement of backfill where it has settled below the lines established by the Engineer shall be considered part of such repair work. The Contractor shall make all repairs and replacements promptly upon receipt of written orders for same from the Engineer. If the Contractor fails to make the repair and replacements promptly, the District may do the work, and the Contractor and his surety shall be liable to the District for the cost thereof.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Select Backfill Material, and Special Bedding and Backfill

Select backfill material shall be selected from the excavated material or imported when not available from the excavated material. In either case, it shall be provided at the Contractor's expense, and shall be included in the costs proposed for pipeline installation on the bidding sheets.

Where called for on the plans or in these specifications, and not covered by a separate bid item, special bedding or backfill shall be included in pipeline construction costs on the bidding sheets.

Where required by the governing agency or by the District to meet compaction requirements of these specifications or requirements of these specifications for bedding or for select granular backfill, special bedding or imported backfill and disposal of excavated spoil shall be provided at the Contractor's expense.

The requirements for special bedding and backfill at the Contractor's expense as described herein as a part of the Special Conditions or as shown on the Contract Drawings shall supersede and take precedence over any and all other requirements for measurement and/or payment for special bedding or backfill found elsewhere in these specifications. Bedding is defined herein to include sand, rock or concrete base, cradle, or encasement. Backfill material is defined herein to include backfill for both trench backfill and pipe bedding (or pipe zone backfill).

Special bedding or backfill not called for on the plans or in these specifications, but required by the Engineer over and above the requirements of this specification shall be constructed at additional cost, at prices reflecting current material costs as evidenced by paid vouchers, plus 50% to cover all costs of installation and overhead.

The encounter of ground water not anticipated in engineering reports made available for this contract, and the required over-excavation and construction of a stable base as determined necessary by the Engineer shall be considered over and above the requirements of this specification, and the required base shall be paid for at the above stipulated prices.

PART 3 – EXECUTION

3.01 WEATHER LIMITATIONS

Excavating and grading shall be performed only when the weather conditions do not adversely affect the quality of the finished product. Any graded or excavated areas that are damaged by the effect of rain, or other weather conditions, during any phase of the construction, shall be re-excavated, regraded, and recompacted to conform to the herein specified requirements, without additional cost to the District.

3.02 PREPARATION

A. Dust Abatement

The Contractor shall furnish all labor, equipment and means required and shall carry out protective measures wherever and as often as necessary in the opinion of the Engineer to prevent his operations from producing dust in amounts damaging to property or causing nuisance. The Contractor shall be responsible for any damage resulting from dust originating from his operations. **The Contractor shall also make himself knowledgeable of Southern California Air Quality Management District's Rule 403-Fugitive Dust and comply with these requirements.** The dust abatement measures shall be continued until all required resurfacing is completed or until the Contractor has completed arrangements with the proper authorities whereby he is relieved of further responsibility. Such arrangements shall be approved by the Engineer prior to their completion. All compensation to be received for dust abatement shall be included in the prices named for appropriate items of the bidding sheet.

B. Utilities and Substructures

The indication of the type and approximate location of existing utilities and substructures in the Contract Documents represents a diligent search of known records, but the accuracy and completeness of such indications are not warranted by the District and utility structures and services not so indicated may exist. Before commencing any excavations, the Contractor shall investigate, determine the actual locations, and protect the indicated utilities and structures, shall determine the existence, position, and ownership of other utilities and substructures in the site or where the work is to be performed by communication with such owners, search of records, or otherwise, and shall protect all such utilities and substructures.

C. Control of Water

The Contractor shall acquire such permits and take such measures as may be required, and shall furnish, install, and operate such pumps or other devices as may be necessary to remove any seepage, storm water, or sewage that may be found or may accumulate in the excavations during the progress of the work. The Contractor shall keep all excavations entirely free from water at all times during the construction of the work and until the Engineer gives permission to cease pumping. He shall keep the complete work reasonably free from accumulations of water and sewage, and shall free it entirely at such times as may be required by the Engineer for inspection or other purposes. Any accumulated water or sewage thus pumped shall be disposed of in accordance with good practice and local ordinances.

The Contractor shall provide an adequate dewatering system for the control of surface and groundwater seepage into the excavations as may be required during the construction period. The proposed plan of this dewatering system shall be submitted to the Engineer for concept approval prior to the installation of the system.

3.03 CONSTRUCTION

A. Excavation

The Contractor shall perform all excavation necessary or required for the construction of the facilities covered by these specifications. Excavations may be performed by either hand or machine methods and shall be of sufficient size to provide adequate space for working in accordance with safety regulations and practice and the Contract Drawings. Excavations shall include the removal and disposal of all materials of whatever nature and quantity including water, rock, decomposed granite, or any other type of soil or material, subsurface obstructions and also overhead obstructions which may interfere with the

operation of equipment used on the work, for no additional compensation. Excavation shall immediately precede subsequent construction, and shall not remain open longer than necessary for construction. Excavation for foundations shall be made only after construction of subgrade, as hereinafter described, has been completed.

Over-excavation for foundations shall be filled with concrete.

1. Seismic Investigation. In suspected or known fault areas, Contractor shall make his trench or excavation available to the property owner or his geologist for seismic investigations as required under the Alquist-Priolo Geologic Hazard Zones Act. Such investigation shall involve no delay to the Contractor.
2. Trench Excavation. Unless otherwise specified in the Special Conditions or on the Contract Drawings, pipeline trenches and clearances shall be per Standard Drawing SB-158 for sewer pipeline installations and B-286B for water pipeline installations. The sides of the trench shall be parallel to and at equal distance on each side of the centerline of the pipe.

The maximum length of trench which shall be opened or partially opened at any one time shall be limited to 500' for sewer lines and one-half mile for water pipelines, except where governed by other agencies or approved by the Engineer. See Section 3.04. J, "Clean-up During Construction" for maximum trench length without restoration. Bell holes or depressions shall be dug by hand at the proper locations of sufficient size to adequately work the joints, but no larger than is required.

When the trench is excavated to the line and grade as shown on the drawings, and the bedding material encountered is rock, the trench shall be excavated an additional depth of at least 4" below the grade for the bottom of the pipe, and the bottom of the trench shall be refilled with approved material, moistened and compacted by tamping or by other approved method to the satisfaction of the Engineer.

Where ground water is encountered and the native material does not afford a solid foundation for pipe subgrade as specified above, the Contractor shall excavate to such depth below subgrade as determined necessary by the Engineer and shall construct a stable base by placing crushed rock bedding upon which subgrade can be prepared. Crushed rock for bedding shall be one and one-half inch (1 1/2") maximum size.

When the trench has been inadvertently excavated below the designed grade, at the Contractor's expense, the bottom of the trench shall be refilled with approved material, well compacted into place in an approved manner and to the satisfaction of the Engineer.

3. New Subdivision Construction. Where pipelines are to be constructed in new subdivision developments, it is anticipated, unless otherwise stated, that sewers will be installed after grading is completed to subgrade in streets and proposed paved areas, and to final grade in other areas; then curbs will be constructed prior to water system construction. Only after water system construction will other utilities, roadway base, and paving be placed.
4. Excavated Materials. Shall be piled neatly along the side of the trench and adjacent to manhole excavations in such a manner as to be of as little inconvenience as possible to the public traffic or the occupants of the adjacent property, and be in compliance with safety standards and soils report recommendations.

Through all cultivated areas, topsoil removed from excavations shall be replaced as backfill in the uppermost part of the excavation to a depth as it existed previous to excavation, not exceeding 18". Where topsoil replacement is required, excavated topsoil shall be stored separately from other materials and in general shall be replaced as backfill in the same parcel of land from which it came.

5. Manhole Excavations. Shall be made to the depths as indicated on the drawings, with sufficient side clearances to provide adequate working space for the construction of the manhole structure.

When unsatisfactory soil bearing conditions, such as soft mud, quicksand, or other unstable materials are encountered at the elevation of the bottom of the manhole, the base shall be made firm and solid by removing said unstable material to sufficient depth and replacing same with crushed rock, gravel, or other approved material, well compacted into place in a manner approved by the Engineer.

6. Blasting. The use of explosives on the work shall be subject to the approval of the Engineer. All operations involving the handling and storage and use of explosives shall be conducted with every precaution prescribed by the Construction Safety Orders of the Division of Occupational Safety and Health of the State of California and by local laws and regulations. Only competent, reliable men working under experienced supervision shall be permitted to use explosives. The Contractor will be held responsible for and shall make good any damage caused by blasting or otherwise resulting from disposition or use of explosives on the work.
7. Cutting. In cutting or breaking up street surfacing, the Contractor shall use equipment acceptable to the authorities concerned. The pavement to remain in place shall be trimmed with an approved cutting device in such manner as to leave a vertical face with sound, unfractured pavement. All pieces of pavement resulting from cutting or breaking up street surfacing shall be removed from the trench area prior to trenching.
8. Disposal of Excavated Materials. Insofar as space is available in the right-of-way, such space may be used for temporary storage of excavated material, to be used for backfill, provided that no material shall be stored or deposited in violation of any ordinance or regulation prohibiting the filling or obstructing of water courses in drainage channels. Storage of excavated material in any street or highway shall conform to the regulations of the public authority having jurisdiction there over. All materials removed from the excavations in excess of that stored temporarily as above specified shall be immediately hauled away and used in backfilling elsewhere, or, if not used, shall be disposed of by the Contractor. The disposal area shall be acquired by the Contractor. No materials shall be disposed of either temporarily or permanently on privately or publicly owned property unless the Contractor shall first obtain permission therefore from the owner or agency concerned. The Contractor shall furnish satisfactory evidence to the Engineer that such consent has been obtained and shall be responsible for all damages and claims that may arise in connection therewith.
9. Bracing and Shoring. The Contractor shall furnish, place and maintain such bracing and shoring as may be required to support the side of the excavations for the proper protection of workmen, to facilitate the work and prevent damage to the pipes and manholes being constructed, and to prevent damage to adjacent structures or facilities. Upon completion of the work, all bracing and shoring shall be removed unless otherwise directed or permitted by the Engineer. Site conditions that alter shoring submittals such as blasting, groundwater, differing soils, etc., must be reviewed for adequate shoring by Contractor or his Engineer.

10. Bridges. Foot bridges of approved construction, not less than 4' in width, and provided with hand rails and uprights of dressed lumber, shall be installed over the trenches at all crosswalk intersections and at such other points where, in the opinion of the Engineer, traffic conditions make it advisable. Substantially constructed bridges, adequate for handling all vehicular traffic, shall be installed over any trench or other excavation in a street intersection whenever such excavation is in excess of half the width of the street crossing. Adequate bridges shall be provided to make possible the safe and full use of all driveways or roadways used to move vehicles from the public street onto private property.

All bridges required to be installed shall be maintained in place as long as the condition of the work requires their use for the safety or convenience of the public, except that when necessary for the proper prosecution of the work in the immediate vicinity of a bridge, said bridge shall be relocated to take care of the traffic requirements, or may be temporarily removed for such period or periods of time, at the Contractor's risk, as the Engineer may approve.

B. Installation

1. Pipe. The pipe manufacturer shall send a field representative to answer any questions on installation procedures, within 48 hours of request, as coordinated by and through the Engineer.
2. Concrete Encasement. Where required on the Contract Drawings, concrete cradles and encasements shall be constructed in accordance with the requirements stated thereon.

Whenever the maximum allowable width of trench as specified elsewhere in these specifications or in the construction plans or the standard drawings, is exceeded for any reason except as provided for in the plans or special conditions or by the written direction of the Engineer, and where the resulting effect of the exceeded trench width would place loads upon the pipeline exceeding the maximum loads recommended by the pipe manufacturer, the Engineer may require, at his discretion, that the Contractor, at his own expense for all labor and materials cradle the pipe in Class "C" concrete, as described in this specification.

C. Fill, Backfill and Grading

Fill, Backfill and Grading shall include all scarifying, moistening, compacting, and other manipulations of the soil necessary to obtain the required densities, cross sections, lines, grades and surface finish indicated or specified. Backfill shall not be placed in trenches or excavations until the pipelines and structures in the particular section involved have been inspected and approved for backfilling by the Engineer.

Backfill shall be placed, insofar as practical, as the work progresses, allowing time for concrete (if used) to attain sufficient strength.

All excavations outside the completed pipelines and structures shall be backfilled with compacted material to the level of the original ground surface unless otherwise shown on the drawings or ordered by the Engineer. The materials used for backfill shall be imported, selected material, or approved selected excavated materials and shall be placed as directed by the Engineer. All materials placed within 6" of the pipe or structure shall be free from rocks or boulders larger than 1 1/2" maximum dimension, and from unbroken masses of earthy materials which might lodge and thereby cause unfilled pockets in the excavation.

Unsuitable material encountered at the surface upon which the bedding material is to be placed shall be removed to a depth as determined in the field by the Engineer. Unsuitable material shall be as determined by the Engineer. If not otherwise specified, removal of material and additional bedding so ordered over and above the amount required will be paid for in accordance with the specifications unless, however, the necessity for such additional bedding materials has been occasioned by an act or failure to act on the part of the Contractor, in which event the Contractor shall bear the expense of the additional excavation and backfill to the required depth. The Contractor's attention is called "dewatering" procedures to ensure that an otherwise stable foundation will not be rendered unfit due to accumulation of water in the trench excavation. However, the Contractor has the responsibility to reasonably ascertain the soil conditions prior to bid. The cost of removing the unsuitable materials should have been known prior to bid and be included in the bid price.

Imported materials (if any) required for fill or backfill shall be provided by the Contractor from areas outside the site at his own expense. Such material shall be as herein specified and must be approved by the District before delivery to the site.

1. Structure Backfill. The Contractor shall place all backfill about structures to the original ground level, or to the lines shown on the drawings or prescribed by the Engineer. Fill materials shall be of earth only, and be free from debris, vegetation, alkali, or other deleterious substances.

All backfill about structures shall be placed in layers not more than 6" thick prior to compaction, which shall be obtained by moistening to optimum moisture content prior to placing and compacting to maximum compaction by use of suitable equipment approved by the Engineer.

The Contractor shall take all necessary precautions to protect the structure and underground facilities during the placement, compacting or consolidating, and grading of backfill.

2. **Pipeline Backfill.** **Full-time observation and testing will be required during all backfill and compaction activities on pipelines by a District approved soils firm.** Except as otherwise required by the construction plans or the standard drawings, the material used in backfilling to 1' above the pipe shall be granular material approved by the Engineer and in accordance with the manufacturers requirements, sandy, or sandy gravel material obtained from required excavation or from approved borrow areas, as shown on the Contract Drawings or as directed by the Engineer.

This material shall be carefully placed and compacted to provide a firm continuous bedding and encasement for the pipe. Pipe shall be shaded the same day it is laid to protect it from possible damage and/or thermal expansion. Pipe zone backfill may be consolidated by careful flooding to saturation only if the soil has a Sand Equivalent of 30 or better and no more than 10% fines (particles passing the no. 200 sieve), otherwise mechanical compaction will be required or as specified elsewhere in these specifications.

Variations to the foregoing pipeline backfill requirement, when recommended by the pipe manufacturer or requested by the Contractor, shall be submitted for approval by the District prior to the commencement of such pipe installation. The method of compaction shall then be proven before backfilling more than the footage of pipe allowed by the contract specification. In lieu of a specific contract requirement, not more than 1000' of pipe shall be laid and backfilled prior to proving the method of compaction.

The remaining trench backfill shall consist of select backfill material from the excavation, when available, free from stones or lumps exceeding 3" in greatest dimension, and free from vegetable matter or other unsatisfactory material. This select material as defined herein and elsewhere in these specifications shall be placed in layers not exceeding 2' in depth, unless otherwise directed by the Engineer. Excavated soils that have excessive moisture must be dried, mixed, or replaced with suitable material that will meet the compaction requirements at no additional cost to EMWD. Each lift shall be consolidated in such a manner that the backfill will meet the requirements of these specifications. Care shall be taken not to disturb the backfill previously placed, and the Contractor shall at all times protect the pipe against flotation. Material placed between successful test and failed test shall be tested at one-fifth (1/5) the distance intervals until a passing test is achieved. All material from failed test to successful test shall be removed, recompacted and retested.

3. **Sewer Line Backfill.** Backfill shall not be placed in trenches or excavations until the sewer lines and manholes in the particular section involved have been inspected and approved for backfilling by the Engineer.

For all sewer pipe, select granular backfill having a Sand Equivalent of 30 and less than 10% fines (particles passing the no. 200 sieve) shall be used up to an elevation 12" above the top of pipe, imported whenever the Engineer determines that native material is not satisfactory. Material for this purpose shall conform to the requirements as set forth herein. The pipe zone backfill shall be carefully packed under the haunches of the pipe and brought up simultaneously on both sides, to the full specified depth, so as to prevent any displacement of the pipe from its true alignment. In compacting by flooding, no ponding of water above the surface of the sand will be permitted.

4. Water Line Backfill. Prior to backfilling, all pipe 30" in diameter and larger shall be either filled with water under pressure or braced with stulls sufficiently to prevent distortion while placing, consolidating and compacting back fill. Prior to backfilling, all trench supports shall be removed unless otherwise approved by the Engineer.
5. Gravel Fill. Gravel fill shall be placed where specified, indicated on the plans, or designated by the Engineer to meet special conditions encountered.

Where gravel fill is required, crushed rock may be substituted or added. Crushed rock for foundations shall be as defined for pipe bedding which is described elsewhere in this specification.

The percentage composition by weight of gravel fill shall conform to the following grading when determined by Test Method No. Calif. 202:

<u>Sieve Sizes</u>	<u>Percentage Passing Sieves</u>
1"	100
¾"	85-100
No. 4	35-55
No. 30	10-30
No. 200	2-9

6. Compacting and Surfacing. Except as otherwise specifically required by the encroachment permit or elsewhere in these specifications, the following requirements will apply:

The upper portion of the final lift will be backfilled with selected material from the excavation, moistened to optimum moisture content and compacted by mechanical tamping to meet the requirements of the District standards. All backfill in public roads shall be consolidated and surfacing shall be placed to meet State of California and Riverside County requirements as stated in the respective permit, whether or not required by the inspector for that particular agency - unless otherwise approved by the Engineer.

Where backfill is in areas not within public roads, it shall be consolidated and tested to meet the requirements of these specifications, except as otherwise approved by the Engineer.

Minimum acceptable field densities specified in District standards shall be determined in accordance with the testing procedures set forth elsewhere in these specifications.

Where sand material of an approved grade is used for backfilling, mechanical compaction may be eliminated and compaction obtained by jetting.

Except as otherwise required by a specific permit, where pavement is being replaced, an approved plant mixed surfacing shall be placed to a minimum thickness of 3" when compacted. Surfacing in streets shall be maintained to original street grade after laying and any settlement filled with plant mix surfacing.

The edges of trenches which are broken down during the making of subgrade shall be removed and trimmed neatly before refilling or resurfacing. When the backfill is complete and excess material removed, the surface will be graded and a layer of approved decomposed granite will be placed with a minimum thickness of 4" when compacted at optimum moisture content by rolling and to a grade to conform to the original roadway section. All pavements outside the paylines damaged by the Contractor shall be trimmed and repaired.

If the edge of the excavated trench when trimmed is within 2' of the edge of the roadway pavement, then the pavement shall be completely removed to the edge of the roadway and replaced with the replacement of the trench pavement. Except as otherwise directed by the Engineer, after a period of not less than 30 days or more than 60 days, any settlement shall be filled with decomposed granite. The top 2½" shall then be road mixed where allowed, with a minimum of 1½ gallons liquid asphalt binder of grade SC3 or 4 (as directed) per square yard and compacted to the original roadway section. Each phase shall be approved by the Engineer before proceeding to the next operation. Where allowed, the road-mixed surfacing operation shall conform to the Standard Specifications of the State of California Department of Transportation.

Pavement, curbs, gutters and walks removed, cut or damaged during the construction of facilities shall be replaced or restored to their original condition, or as otherwise specified. Local ordinances governing such replacement shall be adhered to in all respects.

Removal and/or replacement of pavement where pavement now exists, as well as removal and/or replacement of any other obstructions, will be included in the item cost for the particular installation, unless specifically itemized separately on the bidding sheet.

D. Paving

Where not required otherwise by specific contract requirements or permit requirements incorporated in the contract, the Contractor shall construct new asphalt concrete paving as indicated on the Contract Drawings and as specified herein. All paving proposals and operations shall be subject to the approval of the Engineer.

Where this work is included in a lump sum bid item, it is the Contractor's responsibility to satisfy himself as to the exact lengths and/or dimensions of new roads and pavements. Terminals of all surfacing indicated on the Contract Drawings shall join any existing surfaces in a smooth juncture.

1. Sub-base

- a) Preparation. The upper 12" of sub-base in any area to be paved shall be compacted to not less than 95% of maximum compaction, as determined by currently adopted ASTM D-1557 and procedure C.
- b) Weed Killer. After the sub-base has been prepared, a weed killer shall be applied to the entire sub-base. Weed killer shall be OUST XP as manufactured by DUPONT, or approved equal. The weed killer shall be applied according to the manufacturer's published instructions.

2. Aggregate Base Course. Shall be Class II aggregate base. The aggregate base course shall be the thickness shown on the plans and shall be placed in maximum 4" lifts. Aggregate base course shall be compacted to 95% of maximum compaction, as specified by ASTM D-1557. Aggregate base course shall be furnished, spread and compacted, as specified for Class II Aggregate Base Course in the Standard Specifications, State of California,

Department of Transportation, latest edition. A spreader box will not be required but care shall be taken to prevent segregation during placement.

3. Asphalt Concrete

- a) Asphalt Concrete shall conform to the requirements of Caltrans Standard Specifications Section 39, for Type "B". Aggregate will conform to a grading for 1/2" maximum aggregate with paving grade asphalt PG 64-10 (Section 92) unless otherwise directed by the Engineer.

- b) Proportioning, Mixing, Spreading and Compacting. The proportioning and mixing of aggregates and asphalt, and the spreading and compacting of the asphalt concrete to make up the asphalt pavement, shall be in accordance with the Standard Specifications, State of California, Department of Transportation, latest edition. The paving machine shall have a self-screening spreader unless approved otherwise by the Engineer.
- c) Tack Coat. Tack coat shall be Type SS1H grade Anionic Asphaltic Emulsion as per Caltrans Standard Specification 94.
- d) Prime Coat. When indicated on the Plans or in the Special Provisions, a prime coat consisting of Grade SC-250 liquid asphalt shall be applied in accordance with Caltrans Standard Specification Sections 39 and 93.
- e) Paving. The asphalt concrete pavement shall be no less than the thickness as shown on the plans and shall be applied in two (2) lifts. The first lift shall be the leveling course and the second lift shall be the wearing course not less than 1" thick and shall bring the pavement to full thickness.

The finished surface shall be free from depressions exceeding 1/4" as measured with a 10-foot straightedge in any direction, except where the drawings show a grade break.

- f) Seal Coat. Seal coat shall be a Bituminous Fog Seal in accordance with Caltrans Standard Specification Section 37.
- g) Joining Existing Pavement. Existing paving which is to be joined by new paving shall be saw-cut to provide straight true neat joints.
- h) Paving Headers. Edges of paving shall be bounded by 2 x 6 net new rough cut redwood unless otherwise shown on the plans.
- i) Asphalt Curbs. Automatic curbing machines shall be used to construct asphalt curbs. The curb cross section used shall be as shown on the drawings or as approved by the District.
- j) Paving Removal. Where paving is shown to be removed on the drawings, it shall mean that all asphaltic concrete and aggregate base shall be removed.

4. Removal and Replacement

- a) General. Replacement of street, driveway, alley entrance, and other type pavements shall be of the same material as the existing pavement, constructed in accordance with the applicable drawings and specifications.

The Contractor shall install temporary asphalt pavement of the first course of permanent replacement immediately following backfilling and compaction of trenches that have been cut through pavement. Except as otherwise provided, this preliminary pavement shall be maintained in a safe and reasonably smooth condition until required backfill compaction is obtained and final pavement replacement is ordered by the Engineer. Temporary paving removed shall be hauled from the job site and disposed of at the Contractor's expense.

Where a longitudinal trench is partly in pavement, the pavement shall be replaced to the original pavement edge, on a straight line, parallel to the centerline of the roadway.

Where no part of a longitudinal trench is in the pavement, surfacing replacement will only be required where existing surfacing materials have been removed or damaged.

When the trench cut is in aggregate surfaced areas, the replacement shall be of aggregate base course material compacted to 95% of its maximum compaction.

- b) Asphalt Pavement Replacement. Asphalt pavement replacement shall be of the same thickness as the adjacent pavement and shall match as nearly as possible the adjacent pavement in texture.

Existing asphalt pavements to be removed for trenches or other underground construction or repair shall be cut by a wheel cutter, clay spade, or other device without damaging adjacent pavement that is not to be removed. The Engineer's decision as to the acceptability of the cutting device and its manner of operation shall be final.

The existing pavement shall be cut and trimmed after placement of required ABC and just prior to placement of asphalt concrete for pavement replacement, and the trimmed edges shall be painted with a light coating of asphalt cement or emulsified asphalt immediately prior to constructing the new abutting asphalt pavements. No extra payment shall be provided for these items, and all costs incurred in performing this work shall be incidental to pipe laying or pavement replacement.

Asphalt pavement replacement shall conform to the contour of the original pavement. A 10-foot straightedge shall be laid parallel to the centerline of the trench when the trench is running parallel to the street and across the pavement replacement when the trench crosses the street at an angle. Any deviation in the cut pavement replacement and the old pavement greater than 1/4" in 10 feet (10-foot straightedge) shall be removed and corrected.

- c) Portland Cement Concrete Pavement Replacement. Where trenches lie within the portland cement concrete section of streets, alleys, driveways, sidewalks, etc., such concrete shall be saw-cut (to a depth of not less than 1½") to neat, vertical, true lines in such a manner that the adjoining surfaces will not be damaged.

The pavement replacement shall be Class "A" concrete placed to the dimension as shown on the drawings. Expansion joints shall match the existing expansion joints in the old pavement.

The surface shall be wood float finish with no greater variance than 1/4" in a 10-foot straightedge either across the pavement replacement or longitudinal with the centerline of the ditch. Any greater variance than the above 1/4" shall be cause for rejection of the pavement replacement. Before placing the concrete replacement, the edges of the old pavement shall be thoroughly cleaned and given a wash of neat cement and water.

- d) Curb, Gutter, and Sidewalk Replacement. Where any concrete curb, gutter, or sidewalk has been removed or displaced, the same shall be replaced to the nearest construction joints with new asphalt or concrete to the same dimensions, material, and finish as the original construction that was removed.

Expansion joints shall be the same spacing and thickness as on the original construction.

- e) Expansion Joints. Expansion joints shall be constructed in curb, walk, and gutter as shown on the plans or as specified herein. Such joints shall be filled with premolded joint filler. No such joints shall be constructed in crossgutters, alley intersections or driveways except as may be approved by the Engineer.

One-half inch (13 mm) joints shall be constructed in curb and gutter at the end of all returns except where crossgutter transitions extend beyond the curb return, in which case they shall be placed at the ends of the crossgutter transition. No joints shall be constructed in returns.

Where monolithic curb and gutter is constructed adjacent to concrete pavement, no expansion joints will be required except at EC and BC of curb returns. Expansion joint filler 1/4" (6 mm) thick shall be placed in walk at the EC and BC of all walk returns, around all utility poles which may project into the concrete along the line of the work, and in walk returns between the walk and the back of curb returns when required by the Engineer. At the EC and BC and around utility poles, the joint filler strips shall extend the full depth of the concrete being placed. Joint filler strips between walk and curb shall be the depth of the walk plus 1" (25 mm) with the top set flush with the specified grade of the top of curb. All expansion joint filler strips shall be installed vertically, and shall extend to the full depth and width of the work in which they are installed, and be constructed perpendicular to straight curb or radially to the line of the curb constructed on a curve. Expansion joint filler materials shall completely fill these joints to within 1/4" (6 mm) of any surface of the concrete. Excess filler material shall be trimmed off to the specified dimension in a neat and workmanlike manner. During the placing and tamping of the concrete, the filler strip shall be held rigidly and securely in proper position.

f) Weakened Plane Joints.

- (i) General. Weakened plane joints shall be straight and constructed in accordance with Subsections "Control Joint" and "Plastic Control Joint" below, unless otherwise shown on the drawings.

In walk, joints shall be tranverse to the line of work and at regular intervals not exceeding 10' (3 m). At curves and walk returns, the joints shall be radial.

In gutter, including gutter integral with curb, joints shall be at regular intervals not exceeding 20' (6 m). Where integral curb and gutter is adjacent to concrete pavement, the joints shall be aligned with the pavement joints where practical.

- (ii) Control Joints. After preliminary troweling, the concrete shall be parted to a depth of 2" (50 mm) with a straightedge to create a division in the coarse aggregate. The concrete shall then be refloated to fill the parted joint with mortar. Headers shall be marked to locate the weakened plane for final joint finishing, which shall be accomplished with a jointer tool having a depth of 1/2" (13 mm) and a radius of 1/8" (3 mm). The finished joint opening shall not be wider than 1/8" (3 mm).

- (iii) Plastic Control Joints. The joint material shall be a T-shaped plastic strip at least 1" (25 mm) deep, having suitable anchorage to prevent vertical movement, and having a removable stiffener with a width of at least 3/4" (20 mm). After preliminary troweling, the concrete shall be parted to a depth of 2" (50 mm) with a straightedge. The plastic strip shall be inserted in the impression so that the upper surface of the removable stiffener is flush with the concrete. After floating the concrete to fill all adjacent voids, the removable stiffener shall be stripped. During final troweling, the edges shall be finished to a radius of 1/8" (3 mm) using a slit jointer tool.

3.04 FIELD QUALITY CONTROL

- A. Contractor's Responsibility for Safety
The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work. This requirement will apply continuously 24 hours a day every day until final acceptance of the work and shall not be limited to normal working hours.
- B. Warnings and Barricades
The Contractor shall provide and maintain barricades, guards, temporary bridges and walkways, watchmen, night lights and danger signals illuminated from sunset to sunrise, and all other necessary appliances and safeguards to protect the work, life, property, the public, excavations, equipment, and materials. Barricades shall be of substantial construction and shall be painted such as to increase their visibility at night. Suitable warning signs shall be so placed and illuminated at night as to show in advance where construction, barricades, or detours exist. Guard rails shall be provided for bridges and walkways over or adjoining excavations, shafts, and other openings and locations where injury may occur.
- C. Fire Prevention
The Contractor's Safety Officer shall inspect the entire work and site, including storage areas, at frequent intervals to verify that fire prevention measures are constantly enforced.
- D. Fire Extinguishers and Hoses
The Contractor shall furnish and maintain fully charged fire extinguishers of the appropriate type, supplements with temporary fire hoses wherever an adequate water supply exists, at the places where burning, welding, or other operations that may cause a fire are being performed.

- E. Flammable or Toxic Materials
Only a working supply of flammable or toxic materials shall be permitted on or on any of the permanent structures and improvements, and shall be removed therefrom at the end of each day's operations. The Contractor shall store flammable or toxic materials and waste separate from the work and stored materials for the work in a manner that prevents spontaneous combustion or dispersion, and none shall be placed in any sewer or drain piping nor buried on the site.
- F. Safety Helmets, Clothing, and Equipment
The Contractor shall not permit any person for whom he is responsible or liable to enter or remain on the site of the work unless the person is equipped with and wearing a safety helmet and other protective clothing and safety equipment conforming to the requirements of the District or regulatory agencies, and shall discharge from the site all persons not so equipped. The Contractor shall post conspicuous signs at appropriate locations warning the public and persons engaged upon the work of this requirement. The Contractor shall furnish for their temporary use such safety helmets, protective clothing, and safety equipment as the Engineer may request of him.
- G. Hazardous Areas
The Contractor shall not permit or allow any person or persons to enter any pipe or space containing hazardous or noxious substances or gases, or where there is an insufficient amount of oxygen to sustain life and consciousness, or any other hazardous area unless equipped with lawful and appropriate safety equipment and life-supporting apparatus, and unless those entering are continually monitored and guarded by and in communication with other persons outside the space or area who are equipped in the same way, can give an alarm to others for assistance, and initiate immediate rescue operations in the event of mishap.
- H. Work During an Emergency
The Contractor shall perform any and all operations and shall furnish any materials and equipment necessary during an emergency endangering life or property and, in all cases, shall notify the District of the emergency as soon as practical, but shall not wait for instruction before proceeding to properly protect both life and property. Any additional compensation or extension of contract time claimed by the Contractor on account of an emergency shall be applied for as provided in the specifications.
- I. Compaction Tests
All compaction tests required by either the governing agency having jurisdiction over the right-of-way or by the District shall be performed by the District or its agent at District expense. However, in the event these tests prove the compaction to be unacceptable to either the governing agency or the District, all subsequent tests required by the governing agency or the District shall be performed at the Contractor's expense.

Tests will be scheduled within 24 hours of the Contractor's request for tests, at locations to be selected by the District and/or the governing agency. However, tests shall not be scheduled until a minimum 4-hours work is available for the testing laboratory, as determined by the Engineer. Results of these tests shall then be available within 48 hours.

In-place soil densities shall be determined by the sand cone method of test in accordance with currently adopted ASTM Standard D-1556, or by the nuclear method of test in accordance with ASTM Standard D-2922.

Optimum soil moisture-compaction relations shall be determined by the method of test specified in ASTM Standard D-1557, except as otherwise specified in the Special Conditions.

Soils testing provided by EMWD to determine compliance with the requirements of this specification does not relieve the Contractor of his/her responsibility.

In accordance with provisions for guarantee of the work, the Contractor shall return at his expense to correct any backfill conditions subsequently found to be substandard by either failure or more extensive testing. The Contractor shall provide all labor and equipment necessary to prepare for all tests and to assist the soils engineer in taking the tests, as directed by the Engineer.

J. Clean-up During Construction

The Contractor shall keep the premises occupied by him in a neat and clean condition, and free from unsightly accumulation of rubbish. Upon completion of the work and before the final estimate is submitted, the Contractor shall, at his own cost and expense, satisfactorily dispose of or remove from the vicinity of the work all plants, buildings, rubbish, rock, unused and excavated materials belonging to him or used under his direction during the construction, and in the event of his failure to do so, the same may be removed and disposed of by the District at the Contractor's expense. Contractor's responsibility shall include satisfactory disposal of all debris or protective material resulting from material delivery such as plastic wrappings, pipe stulls, etc., whether or not the Contractor furnished such material.

The Contractor shall carry on his operations in such sequence and in such manner as to interfere as little as possible with other improvements. When the construction is adjacent to or on residential property or cultivated fields or orchards, disposal of material and backfill operations shall be performed in such manner as to restore the properties to their original condition as nearly as practical as determined by the Engineer. Topsoil shall be carefully removed, stockpiled, and replaced after the backfill is placed.

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As a part of the clean-up operation on facilities in private right-of-way, the Contractor shall restore the soil the full width of the right-of-way to a mechanical condition equivalent to that which existed at the time of the construction operations on such areas, by thoroughly loosening the soil with subsoilers, or other acceptable means and by discing and leveling if necessary, any stones, gravel, or other deleterious material left in spoil banks. On such lands debris shall be removed by the Contractor before his final preparation of the soil and shall be disposed of as required for excavated materials.

In unimproved areas the finish surfaces over pipelines shall be graded to drain surface water away from the center line of the actual trench and provide drainage away from all the structures. No ponding of surface water will be allowed within the construction right-of-way.

Contractor shall complete total trench restoration (original condition or better) within 1,320 feet of trench heading or within 10 working days of construction, whichever represents the least amount of time. Failure of the contractor to comply with the Engineer's cleanup orders may result in an order to suspend work until the condition is corrected. No additional compensation will be allowed as a result of such suspension.

END OF SECTION 02201