SEARLES VALLEY SEWER IMPROVEMENT

100% TECHNICAL SPECIFICATIONS

Prepared For

SAN BERNARDINO COUNTY
PUBLIC WORKS

San Bernardino County
Department of Public Works – Special Districts
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San Bernardino, CA 92415-0763

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Revised 4/26/2024 (Trench Updates to include Geogrid)

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CERTIFICATION

Thes specifications have been prepared by Kimley-Horn and Associates, Inc. under the direct supervision of the following Registered Civil Engineer.

April 26, 2024

Renee Chuang, PE
Registered Civil Engineer
C92140

Date

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TECHNICAL SPECIFICATIONS

San Bernardino County - Public Works Special Districts Department, Division “D” Technical Specifications (2012).

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COUNTY OF SAN BERNARDINO
SPECIAL DISTRICTS DEPARTMENT

PREFACE TO THE TECHNICAL SPECIFICATIONS SEWERS

1. SUPPLEMENTAL DEFINITIONS TO THE TECHNICAL SPECIFICATIONS.

Whenever in these Technical Specifications the following terms, or pronouns in place of them, are used, the intent and meaning shall be interpreted as defined in the Ordinance and Rules and Regulations of the District which regulate the use and construction of sewerage facilities. These supplemental definitions shall apply only to interpretation of these Technical Specifications.

CONTRACT - The written agreement covering the performance of the work and the furnishing of labor, materials, tools and equipment in the construction of the work. The Contract shall include the Notice to Contractors, Proposal, plans, specifications and contract bonds; also, any and all written supplemental agreements amending or extending the work in a substantial and acceptable manner, Supplemental agreements covering alterations, amendments or extensions to the Contract and include Contract change orders.

PLANS - The official project plans, profiles, typical cross sections, working drawings and supplemental drawings, or reproductions thereof, approved by the Engineer, which show the location, character, dimensions and details of the work to be performed, and which are to be considered as part of the Contract.

CONTRACTOR - The individual, partnership, corporation, joint venture or other legal entity entering into a contract with the District to perform the work. In case of the work being done under permit issued by the District, the Permittee shall be construed to be the Contractor.

SPECIFICATIONS, TECHNICAL SPECIFICATIONS - The directions, provisions and requirements contained in the Technical Specifications for the District.

WORK - All the work specified, indicated, shown or contemplated in the Contract to construct the improvement, including all alterations, amendments or extensions thereto, made by supplemental agreements or written orders of the District.

2. WORK SCHEDULE.

One (1) week prior to starting construction, the Contractor shall submit to the District, Engineer and Inspector a written work schedule which shall describe the sequence, time and method of operation that he plans to use on the job. The Contractor shall also provide a mobilization schedule, pipe installation schedule, pipe installation crews, and repair and cleaning crews. The Engineer reserves the right to require the Contractor to schedule the work forces necessary to repair damage due to the construction and restore the area of work to its original condition upon completion of any portion of the pipeline installation. The Engineer reserves the right to alter the schedule to permit the possible activation of certain sewers prior to the completion of the work.

The Contractor shall update this schedule once a month, showing work completed and work in progress. The Contractor shall provide the District, Engineer and Inspector copies of this updated schedule.

3. NOTIFICATION.

The Contractor shall notify the District, Engineer and Inspector one (1) week in advance of when he plans to start construction. The Contractor shall immediately notify all involved agencies when intermittent construction, end of construction, or stoppage in construction occurs.
Minimum of 48 hours notice

4. SAFETY REQUIREMENTS.

All construction and design shall comply in full with all pertinent provisions of current safety laws and codes of OSHA and other Federal, State and Municipal regulatory agencies.

5. REFERENCED STANDARDS AND SPECIFICATIONS.

All references to other standards and specifications in these Technical Specifications shall imply the latest revision thereto.

6. CONNECTIONS TO EXISTING SYSTEMS.

Sewer construction shall start a minimum of five (5) feet from any existing sewer or manhole. The closing section shall not be installed until all mains and manholes have been cleaned, tested and tentatively accepted, in writing by the District.

COUNTY OF SAN BERNARDINO
SPECIAL DISTRICTS DEPARTMENT
TECHNICAL SPECIFICATIONS

SECTION 1
EARTHWORK

1.1 GENERAL.

Earthwork includes all plant labor, equipment, appliances and materials as required or necessary to clear, grub, excavate, trench, fill, backfill and grade for the construction of all structures, pipe lines, ditches, embankments and graded areas shown and specified.

1.2 OBSTRUCTIONS.

All shrubs and brush, stumps and roots, fences, rock, stones, debris, and all obstructions of whatsoever kind or character whether natural or artificial, encountered in the construction of the work shall be removed unless otherwise specified on the construction plans.

In the installation of pipe lines outside of public rights of way or in easements, trees shall not be removed unless otherwise authorized in writing by the Engineer, and all fences, structures and landscaping which are removed or damaged by the Contractor shall be restored to their original condition and/or repaired to the satisfaction of the Engineer as soon as that portion of the work is installed, at the Contractor's expense without any compensation there-for. Any damage done to private property by reason of work on easements shall be the responsibility of the Contractor.

The Contractor shall restore all areas and objects that were damaged or disrupted due to construction activities, to the condition which existed prior to construction. Said restoration shall be completed by the Contractor as a continuing follow-up of any portion of pipe-line construction.

Material that is removed as specified herein is not to be incorporated in the improvement being constructed, shall be disposed of away from the construction site at the Contractor's expense.

The Contractor's attention is directed to the possible existence of pipe and other underground improvements which may or may not be shown on the plans. All reasonable precautions shall be taken to preserve and protect any such improvements whether shown on the plans or not. All improvements necessary to prosecute the work, shall be removed, maintained and permanently replaced at no expense to the District.

1.3 EARTHWORK IN CITY, COUNTY, STATE AND RAILROAD RIGHTS OF WAY.

Earthwork within the rights of way of the State of California, Department of Transportation, County Road Department, and City or other governmental agency having jurisdiction, shall be done in accordance with the requirements and provisions of the permits issued by those agencies for the construction within their respective rights of way. Such requirements and provisions, where applicable shall take precedence and supersede the provisions of these specifications. The requirements of these technical specifications shall be the minimum requirement.

1.4 SAFETY PRECAUTIONS.

All excavations shall be performed, protected and supported as required for safety and in the manner set forth in the operating rules, orders and regulations prescribed by the Division of Industrial Safety of the Department of Industrial Relations of the State of California. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations, from sunset each day to sunrise of the next day until such excavation is entirely refilled. The contractor shall submit to the Engineer for approval a safety barrier and traffic control plan prior to construction.

1.5 EXCAVATED MATERIAL.

Arrangements for disposing of excess excavated material shall be made by the Contractor. Excavated material suitable for backfill shall be stored temporarily in such a manner as will facilitate work under the Contract.

1.6 SHORING, SHEETING AND BRACING.

Sheet piling, shoring, sheeting, bracing, or other supports, where necessary, shall be furnished, placed, maintained and removed by the Contractor. Sheet piling and other supports shall be withdrawn in such a manner as to prevent additional backfill on pipe lines which might cause overloading. At all times, rules of the Division of Industrial Safety of the Department on Industrial Safety of the Department of Industrial Relations of the State of California, with respect to excavations and construction, shall be strictly observed.

In advance of any excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall submit for acceptance of the Owner, or by a registered civil or structural engineer employed by the Owner, to whom the authority to accept has been delegated, 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 established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer. Nothing herein contained shall be deemed to allow the use of shoring, sloping, or protective system less effective than that required by the Construction Safety Orders of the State Division of Industrial Safety. Shoring shall be in compliance with Section 6707 of Chapter 9, Part 1, Division 5 of the Labor Code of the State of California.

Nothing contained in this specification shall be construed to impose tort liability on the Owner, Engineer, or any of their employees.

Section 6500 of the Labor Code requires a permit for trenches five (5) feet or more in depth. **The Owner will not issue a permit for trenching operations under this Contract.** The Contractor, prior to beginning construction, shall obtain from the State Division of Industrial Safety, a permit authorizing said construction.

1.7 CLEARING AND GRUBBING.

Areas where construction is to be performed shall be cleared of all trees, shrubs, brush, rubbish, and other objectionable material of any kind which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or form obstructions therein. Trees and other natural growths outside the actual lines of construction operations shall not be destroyed, and such measures as are necessary shall be taken by the contractor for the protection thereof.

Organic material from clearing and grubbing operations will not be permitted for use as excavation backfill.

It shall be the Contractor's responsibility, at his own expense, to remove and dispose of all excess material resulting from clearing and grubbing operations. The Contractor shall make his own arrangements for disposal sites, where said material may be wasted.

1.8 CONTROL OF WATER.

The Contractor shall provide and maintain at all times during construction, ample means and devices with which to promptly remove and dispose of all water entering the excavations or other parts of the work. No concrete footings or floors shall be laid in water nor shall water be allowed to rise over them until the concrete or mortar has set at least eight (8) hours. Water shall not be allowed to rise unequally against walls for a period of twenty-eight (28) days. Groundwater shall not be allowed to rise around pipe installations until jointing compound in the joints has set.

The Contractor shall dispose of water from the work in a suitable manner, without damage to adjacent property. No water shall be drained into work built or under construction. Water shall be disposed of in such a manner as not to be a menace to public health. Contaminated waters, which require special handling, treatment or disposal methods, or that necessitate disposal away from the construction site will be at the Contractor's expense.

Dewatering for structures and pipe lines shall commence when groundwater is first encountered, and shall be continuous until such times as water may be allowed to rise in accordance with the provisions of this section.

1.9 PIPELINE EXCAVATION.

1.9.01 Excavation. - Excavation for pipelines, fittings, valves, and appurtenances shall be open trench to the depth and in the direction necessary for the proper installation of the same as shown on the plans or as otherwise directed by the Engineer, except where another method is specifically called for in the plans or in these specifications.

1.9.02 Limit of Excavation. - Except with specific approval of the Engineer, no more than four hundred (400) feet of open trench shall be excavated in advance of laying of pipe. All operations shall be carried out in an orderly fashion. Backfilling and clean-up work shall be accomplished as sections of the pipe installation are approved. Public travel through the work shall be impeded or obstructed as little as possible. The remainder of the trench excavated that day shall be backfilled, compacted, and the roadway opened to the public.

At the end of each week, all trenches, including manhole excavations shall be backfilled, compacted, and the roadway opened to the public on Saturday, Sunday, and holidays.

The Contractor shall make the necessary arrangements for, and shall remove and dispose of all excess waste material from the site of the work as portions of the pipe line and appurtenances are installed.

1.9.03 Tunneling - Tunneling will be permitted only where native earth is of such firmness that it will remain in its original position without sloughing off, throughout the work of excavation and backfilling. If sloughing occurs, the roof of the tunnel shall be broken down and the trench excavated as an open trench as herein specified.

1.9.04 Trench Width. - Banks of open cut trenches shall be kept as nearly vertical as possible. Where necessary in order to maintain the banks nearly vertical, the trench shall be properly sheeted and braced. The over-all trench width shall not be more than sixteen (16) inches or less than twelve (12) inches wider than the largest outside diameter of the pipe to be laid therein, measured at a point twelve (12) inches above the top of the pipe exclusive of the branches. Excavation and trenching shall be true to line so that a clear space of not more than eight (8) inches or less than six (6) inches in width is provided on each side of the largest outside diameter of the pipe in place. For the purpose of this section, the largest outside diameter shall be the outside diameter of the coupling.

1.9.05 Correction of Faulty Grades. - Should the excavation for the pipe line be carried below grade without instruction from the Engineer, it shall be refilled to proper grade with pipe-zone material compacted to ninety percent (90%) or crushed rock, at the expense of the Contractor. If compaction tests are required, they shall be at the expense of the Contractor.

1.10 PIPE FOUNDATION AND/OR SUBGRADE.

1.10.01 Foundations in Good Soil. - The trench shall have a flat or semi-circular bottom conforming to the grade to which the pipe is to be laid.

1.10.02 Foundations in Poor Soil. - All soft, spongy, or unstable material in the bottom of the trench shall be removed and replaced with approved material to a depth as determined in the field by the Engineer. The approved material shall be compacted to ninety percent (90%) to provide an unyielding foundation for the pipe. The removal and replacement of material from depths greater than two (2) feet below the grade shown on the plans, will be considered as Extra Work.

1.10.03 Foundation in Rock - Where rock is encountered, it shall be removed below grade and the trench backfilled with suitable material to provide a compacted earth cushion with a thickness under the pipe of not less than one-half (1/2) inch per inch of nominal diameter of the pipe to be installed, with a minimum allowable thickness of six (6) inches.

1.11 TRENCH BACKFILL.

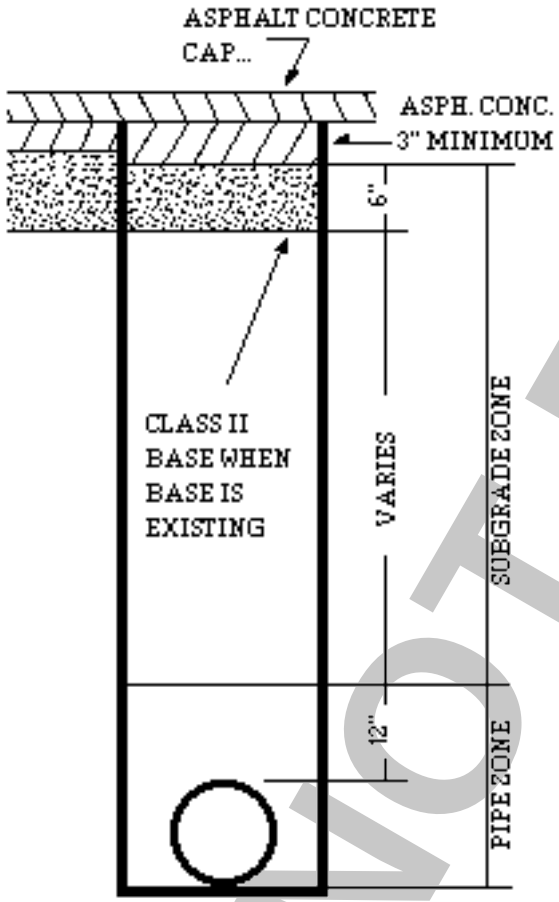
1.11.01 General. - All trenches shall be backfilled after pipe, fittings, valves and appurtenances have been installed. Whenever a relative compaction requirement value is specified hereunder, the optimum moisture content and density shall be determined in accordance with the State of California, Department of Transportation, Test Method No. California 216 or ASTM D1557.

All wood and waste material shall be removed from excavation preparatory to Backfilling. Backfill material shall be approved in all cases by the Engineer and shall be free of trash, wood, large rock, or other objectionable debris. Backfilling shall include the refilling and compacting of the fill in trenches or excavations up to the sub-grade of the street or to the street or to the existing ground surface.

1.11.02 Procedure in Pipe Zone. - Selected backfill material consisting of granular material free form stone, clods, clay, or other deleterious material shall be placed in the trench simultaneously on each side of the pipe for the full width of the trench, in layers of about six (6) inches in depth. Granular backfill with a minimum sand equivalent of 30, when tested in accordance with the California Department of Transportation, test Method No. California 217, will be required in the pipe zone, and the water densification method shall be used to densify the material in the pipe zone. When the excavated material in not granular as mentioned above, the Contractor shall import, at their own expense, and place a suitable granular backfill material. Particular attention is to be given to the underside of the pipe and fittings to provide a firm bedding support along the full length of the pipe. Care shall be exercised in backfilling to avoid damage to the pipe. The pipe zone shall be considered to extend to twelve (12) inches above the top of the pipe.

1.11.03 Procedure Above Pipe Zone. - From the top of the pipe-zone backfill to ground surface, the material for backfill may contain stones ranging in size up to six (6) inches in diameter, in quantity not exceeding forty percent (40%) of the volume when said coarse materials are well distributed throughout the finer materials and the specified compaction may be attained.

1.11.04 Compaction Above Pipe Zone. - Where it is important that the backfill be made safe for vehicular traffic of for the support of structures, the backfill shall be compacted to the densities indicated below in conformance with approved compaction methods.



Sub grade Zone. - This zone is between the sub grade of the aggregate base or the surfacing, and the pipe zone. Backfill in this zone shall be compacted to ninety percent (90%) relative compaction except the upper six (6) inches which shall be compacted to ninety-five percent (95%) relative compaction.

1.11.05 Compaction in Easements. - In easements and open terrain where the degree of compaction is less important, the backfill, if sufficiently granular in nature (sand equivalent of 20 or greater), shall be consolidated by a water densification method. If the backfill is not sufficiently granular in nature, the backfill shall be consolidated by a method approved by the Engineer. Backfill in easements and open terrain shall be compacted to eighty-five percent (90%) relative compaction.

1.11.06 Mechanically Compacted Backfill. - Mechanically compacted backfill shall be placed in horizontal layers of depths compatible to the material being placed and the type of equipment being used. All such equipment shall be of a size and type approved by the Engineer. Each layer shall be evenly spread, moistened (or dried, if necessary), and then tamped or rolled until the specified relative compaction has been attained. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed under the contract. The Contractor shall make his own determination in this regard. Any damage which results shall be the responsibility of the Contractor and shall be repaired or replaced at the Contractor's expense.

1.11.07 Water Densified Backfill. - As used in these specifications, flooding shall mean the inundation of backfill with water, puddled with poles or bars to insure saturation of the backfill material for its full depth. Jetting shall be accomplished by the use of a jet pipe to which a hose is attached, carrying a continuous supply of water under pressure.

1.11.08 Requirements for Densification by Jetting. - Densification by jetting shall be subject to all of the following requirements:

(a) Application of Water. - The Contractor shall apply water in a quantity and at a rate sufficient to thoroughly saturate the entire thickness of the lift being densified. Water for jetting shall be from a continuous supply of water under pressure.

(b) Use of Vibration. - Where densities are required which cannot be attained by jetting alone, the Engineer may direct the Contractor to supplement the jetting process with the application of vibrating compacting equipment to the backfill.

(c) Lift Thickness. - The lift of the backfill shall not exceed that which can be readily densified by the jetting procedure, but in no case shall the undensified lift exceed ten (10) feet for jetting.

(d) Character of Material. - The material being used with the water-settling methods to backfill the trenches in street rights of way shall have a sand equivalent of at least 20 when tested in accordance with the State of California, Department of Transportation Test Method No. California 217. Where the nature of the material excavated from the trench is generally unsuitable for densification with water, the Contractor may, at no cost to the District, import suitable material for jetting, or densify the excavated material by other methods. If water densification methods are employed, the Contractor shall, at his expense, provide a sump and pump to remove the accumulated water from the downstream end of the construction.

(e) Damage to Adjacent Improvements. - The Contractor shall make his own determination that the use of flooding or jetting methods will not result in damage to existing improvements. Permission to use such methods in densifying backfill shall not be construed as guaranteeing or implying that adjacent ground and improvements will be unaffected.

1.11.09 Compaction Test. - Compaction shall be tested in accordance with the methods specified by the State of California Department of Transportation Method No. California 216, or ASTM D1557.

Compaction test of the backfill will be required approximately every three hundred (300) feet, or more often if tests indicate the need, along the alignment on the main pipe line and, in addition, of approximately twenty percent (20%) of all laterals within the street rights of way. The tests shall be made at varying depths.

The Contractor, at his expense, shall excavate the holes for all of the tests, backfill the holes and compact this backfill, and pave the surface, if required, after the test.

1.11.10 Excess Excavated Material. - The Contractor shall make the necessary arrangements for and shall remove and dispose of all excess of waste material. All costs for the disposal of excess of waste material shall be borne by the Contractor.

It is the intent of these specifications that all surplus material not required for backfill shall be disposed of by the Contractor outside the limits of the public rights of way and in accordance with the requirements of the County Code, Title 6, Division 8, or ordinance of any other agencies having jurisdiction, at no cost to the District.

Excavated material shall not be deposited on private property unless written permission from the owner thereof is secured by the contractor. Copies of said written permission, duly signed by the owner of the private property involved, shall be furnished to the Engineer by the Contractor before such material is placed on private property.

1.11.11 Imported Backfill Material. - Whenever the excavated material is unsuitable for backfill, the Contractor shall arrange for and furnish imported backfill material per Sections 1.11.02 and 1.11.08 (d) of this specification, at his own expense. He shall dispose of the excess trench excavation as specified in the preceding paragraph. The backfilling with imported material shall be done in accordance with the methods described.

1.11.12 Completion of Cleanup. - The Contractor shall restore all areas and objects that were damaged or disrupted due to construction activities to a condition equal to that prior to construction. All fences, walls, shrubs, sprinkler systems, substructures or any other improvement removed or disturbed by the Contractor during construction, shall be replaced and/or repaired to the satisfaction of the Engineer immediately as that portion of the pipe line is installed, at the Contractor's expense. Said restoration shall be completed by the Contractor as an immediate follow-up to any portion of the pipe line installation.

1.12 STRUCTURAL EARTHWORK.

1.12.01 Structural Excavation. - The site shall be cleared of all natural obstructions, pavements, utilities and other items which will interfere with construction. Any method of excavation may be employed which, in the opinion of the Contractor, is considered best. Ground shall not be dug by machinery nearer than three (3) inches from any finished subgrade without the express approval of the Engineer. The last three (3) inches shall be removed without disturbing the subgrade. Should the excavation be carried below the lines and grades indicated on the plans, the Contractor shall, at his own expense, refill such excavated space to the proper elevation in accordance with the procedures specified for backfill, or, if under footings, the space shall be filled with concrete.

Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms, installation of services, and for inspection, except where concrete is authorized to be deposited directly against excavated surfaces.

1.12.02 Structural Backfilling. - After completion of foundation footings and walls, and of other construction below the elevation of the final grade, and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all debris. Unless otherwise shown, material or imported sand, gravel, or other material approved by the Engineer, and shall be free of lumps, hard material exceeding six (6) inches in greatest dimension, trash, lumber, or other debris. Backfill shall be placed in horizontal layers not exceeding nine (9) inches in thickness, and shall have a moisture content such that the required degree of compaction may be obtained. Each layer shall be compacted by hand or machine tampers or by other suitable equipment or means, to a relative compaction of at least ninety percent (90%). Dewatering shall be maintained during the placement of compacted, clayey backfill.

1.12.03 Stripping. - All vegetation, such as roots, brush, heavy sods, heavy growths of grass and all decayed vegetable matter, rubbish, and other unsuitable material within the area of work, shall be stripped or otherwise removed before fill is started.

1.12.04 Grading. - After stripping has been done, excavation of every description and of whatever substance encountered within the grading limits of the work, shall be performed to the lines and grades indicated on the drawings. All suitable excavated material shall be transported to and placed in the fill area within the limits of the work. All excavated materials which are considered unsuitable by the Engineer and any surplus of excavated material which is not required for fill, shall be known as waste and shall be disposed of as directed in Section 1.11.10 of this specification. Construction, excavation and filling shall be performed in a manner and sequence that will provide drainage at all times.

Ditches shall be cut accurately to the cross sections and grades indicated. Any excessive ditch excavation shall be backfilled to grade either with suitable, thoroughly compacted material, or with suitable stone or cobble to form an adequate paving.

Surfaces under paved areas, dikes and elsewhere as directed by the Engineer, shall be wetted and compacted prior to placing fill.

1.12.05 Fill. - Fills or embankment shall be constructed at the locations and to the lines and grades indicate on the plans. Suitable material from excavations may be used for fill. Material shall be placed in horizontal layers from eight (8) to twelve (12) inches in loose depth for the full width of the cross section and compacted as specified.

For general fill areas, the fill shall be compacted to ninety percent (90%) relative compaction.
For roadways and all areas to be paved, the fill shall be compacted, by means of a tamping roller or three-wheel power roller, to at least ninety percent (90%) relative compaction.

Dikes and embankments shall be compacted by the use of compaction rollers or three-wheel power rollers to ninety percent (90%) compaction.

Relative compaction shall be as determined in accordance with the State of California Department of Transportation, Test Method No. California 215, or ASTM D1557.

1.12.06 Finish grading. - All areas covered by the work, including excavated and filled sections and transition areas, shall be graded uniformly to the elevations shown on the plans. The finished surface shall be reasonably smooth, compacted, and free from any irregular surface changes. The degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations. The finished surface shall not be more than two- tenths (0.2) foot above or below the established grade. Ditches shall be paved to drain readily. The surface of areas to be paved, on which a surface course is to be placed, shall not vary more than five-hundredths (0.05) foot from established grade and approved cross section.

1.12.07 County and City Grading Ordinances. - In addition to the requirements herein set forth for structural earthwork, all work shall be in accordance with the requirements of the County Code, Title 6, Division 8, or ordinance of any other agencies having jurisdiction.

1.13 DRILLING AND BLASTING.

1.13.01 Use of Explosives. - All operations, storage and handling of explosives shall be according to provisions of Division II, Part I, of the Health and Safety Code, State of California, and shall comply with all State, County and local laws.

1.13.02 Skilled workmen. - Drilling and blasting are to be done only by personnel skilled in rock techniques.

1.13.03 Safety. - All necessary precautions shall be taken for protection of life and property. Warnings shall be given to nearby property owners that blasting is in progress. Safety mats shall be used to restrict flying particles. The Contractor shall size each "shot" to minimize nuisance and reduce the possibility of damage to local structures.

1.14 FINAL CLEANUP.

After all earthwork operations have been completed, the right of way and all other areas shall be dressed smooth and left in a neat and presentable condition to the satisfaction of the Engineer and Owner.

COUNTY OF SAN BERNARDINO
SPECIAL DISTRICTS DEPARTMENT
TECHNICAL SPECIFICATIONS

SECTION 2
CONCRETE CONSTRUCTION

2.1 SCOPE.

The Contractor shall furnish all labor, equipment, materials and appliances necessary to complete construction of Portland cement concrete as shown on the drawings and as specified herein.

2.2 COMPOSITION.

Concrete shall be composed of Portland cement, sand, coarse aggregate, waste, and admixtures as specified or approved, all well mixed and brought to the proper consistency suitable for the specific conditions of placement and in accordance with the requirements of this specification.

2.3 CLASSES OF CONCRETE.

All Portland cement used on the work shall be one of the classes described below. Unless otherwise stated, each class shall be used in the locations as listed:

(a) **Class I.** - Compressive Strength - 3,000 psi min.

Mix - 6-sack minimum test required (Type II cement)

7-sack, Test not required, (trial batch)

Uses: Walls, beams, slabs, footings. Class I. is Equivalent to California State Department of Transportation, Class D (for 7-sack mix).

(b) **Class II.** - Compressive Strength - 3.000 psi min.

Mix - 6 -sack minimum, test required (Type V cement)

Uses: Walls, beams, slabs, footings. Class II is (Where specified.) Equivalent to California State Department of Transportation, Class D.

(c) **Class III.** - Compressive Strength - 2,500 psi min.

Mix - 6-sack, test not required.

Uses: Slabs, footings, walls (where specified). Class III. is Equivalent to California State Department of Transportation, Class A.

(d) **Class IV.** - Compressive Strength - 2.500 psi min.

Mix - 5-sack, test not required.

Uses: Paving, cradles, curbs, gutters, sidewalks, thrust blocks, manhole bases, pipe easements, or where specified. Class IV is Equivalent to California State Department of Transportation, Class B.

2.4 PORTLAND CEMENT.

Unless otherwise specified, Portland Cement shall be Type I, Type II, or Type V, complying with ASTM C 150, and shall have a total alkali content not exceeding six-tenths percent (0.6%) when calculated as sodium oxide as determined by methods given in ASTM C 114. There shall not be a change of brand of cement during course of work without prior written approval of the Engineer.

2.5 SAND.

Sand shall be a washed natural sand having hard, strong, and durable particles, and which does not contain more than two percent (2%) by weight or such deleterious substances as clay lumps, shale, schist, alkali, mica, coated grains, or soft and flaky particles. Sand shall be graded uniformly from fine to coarse, such that the combined grading of coarse aggregate and sand set forth in Paragraph 2.6 will be met. Not more than three percent (3%) shall pass the No. 200 screen as determined by ASTM C 117.

2.6 COARSE AGGREGATE.

Coarse aggregate shall be a clean, hard, fine grained, uncoated, sound crushed rock, or washed gravel or combination of both. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than two percent (2%) by weight of shale or cherty material; and shall show a loss of not more than ten percent (10%) when tested for soundness in sodium sulfate solution in accordance with ASTM C 88. Coarse aggregate shall be graded uniformly from one-quarter (1/4) inch size to maximum size. The Combined grading of coarse and fine aggregate shall fall within the following percentages by weight:

Percentage Passing Sieves

Sieve Size	1-1/2 In. Max.	1 In. Max.	3/4 In. Max.
2 Inch	100	-	-
1- 1/2 Inch	90-100	100	-
1 Inch	50-86	90-100	100
3/4 Inch	45-75	80-90	90-100
3/8 Inch	38-55	65-85	60-80
No. 4	30-45	35-50	40-60
No. 8	23-35	25-40	30-45
No. 16	12-27	19-30	20-35
No. 30	10-17	12-20	13-23
No. 50	4-9	5-10	5-15
No. 100	1-3	1-4	1-5
No. 200	0-2	0-2	0-2

2.7 MIXING WATER.

Mixing water shall be clean and free from deleterious amounts of acids, alkalies, salts or organic materials.

2.8 ADMIXTURES.

Unless otherwise specified or directed by the Engineer, water-reducing admixtures shall be used to reduce the required mixing water, for equivalent slump in plain concrete, at least ten percent (10%). If the admixture used entrains more than two percent (2%) air, the water reduction shall be an additional two percent (2%) for each percent of air entrained over two percent (2%), but in no case shall air entrained exceed five percent (5%).

Air-entraining admixtures shall be included in the mix design. The combined admixtures shall entrain five percent (5%) plus or minus one percent (1%). Acceptable admixtures are those manufactured by Master Builders, Superior Concrete Emulsions and Sika Chemical Corporation. Admixtures containing calcium chloride will not be approved.

2.9 OTHER ADMIXTURES.

No other admixtures shall be used without the Engineer's approval.

2.10 REINFORCING STEEL.

Reinforcing steel shall consist of deformed bars of the size called for in the drawings. Reinforcing steel shall conform to ASTM A 615, and shall be either Grade 40 or Grade 60. Deformations shall conform to ASTM A 615. If specified, mill certificates shall be furnished to the Engineer for each melt if so requested. Wire reinforcement shall conform to ASTM A 82. Placing sheets and bending schedules shall be submitted to the Engineer before placing.

2.11 TEST ON CONCRETE.

Test cylinders of all concrete shall be made in accordance with ASTM C 31 and C 39. A minimum of three (3) cylinders per each one hundred (100) cubic yards of concrete or portion thereof shall be made. One (1) cylinder shall be tested at seven (7) days and one (1) cylinder at twenty-eight (28) days. If test cylinders fail to indicate required strength as specified, cores shall be taken as required by the Engineer and tested in accordance with ASTM C 42, all at Contractor's expense.

If more than one in ten (1 in 10) laboratory control strength test cylinders or any structure fall below the specified compressive strength, the Engineer shall have the right to order a change in proportions or the water content of the concrete for the remaining structures. If the strength of any cured cylinders falls below the specified compressive strength, assuming they have received protection and curing equivalent to concrete in the structure, the Engineer shall have the right to require new mix design with trial batch necessary to secure the required strength and may require tests in accordance with ASTM C 42, or order load tests to be made on the structures so affected.

2.12 MIX DESIGN.

Before beginning concrete work, the proper proportions of materials for each class of concrete shall be determined by the Contractor and/or his supplier. The mix design shall be prepared at the Contractor's expense, by a recognized inspection and testing laboratory approved by the Engineer, and shall show the expected strengths and corresponding slumps, and all ingredient weights and other physical properties necessary to check the design mix. A trial batch shall be made for Class I, II and III concrete to be used on the job, and from each batch, four (4) standard test cylinders shall be cast, cured and tested, as specified for the job concrete. Certified copies of all laboratory reports shall be sent promptly to the Engineer directly from the testing laboratory, stating whether the items reported meet the specifications. A final report shall be submitted at the completion of all concreting, summarizing all findings concerned with concrete used in the project.

If more than one (1) supplier of concrete is used by the Contractor, each shall submit his mix design as described above. When concrete is used for architectural work, only one (1) supplier will be allowed.

2.13 JOINT FILLER.

Preformed fillers shall be of the type indicated on the drawings and shall be as indicated on the drawings.

2.14 WATERSTOPS.

Waterstops shall be installed where so indicated on the drawings. Waterstops shall be of polyvinyl chloride plastic, “Burke Vinylok” type RB 316-4, medium duty or approved equal. Proper care in placing of waterstops in forms shall be exercised so that the center bulb coincides with the construction joint. When concrete is being placed, it shall be properly vibrated to insure density at water stops location. Waterstops shall be made continuous at splices and intersections (horizontal and/or vertical) by “welding” with a polyvinyl chloride splicing iron.

2.15 MIXING.

(a) Job mining of structural concrete will not be permitted unless otherwise specified. When allowed, concrete shall be mixed in a batch mixer of approved type which will insure a uniform distribution of the materials throughout the mass, so than the mixture is uniform in color and homogeneous. All concrete shall be placed within one (1) hour after water is first added to the batch. The mixer shall be equipped with a suitable charging hopper, water storage, and water-measuring device controlled from a case which may be kept locked and so constructed that the water may be discharged only while the mixer is being charged. The entire contents or the mixing drum shall be discharged before recharging. The mixer shall be cleaned at frequent intervals while in use. The volume of mixed materials per batch shall not exceed the rated capacity of the mixer.

(b) Transit-mixed concrete shall be batched, mixed and delivered in accordance with ASTM C 94, except that truck agitators may not be used. All concrete shall be deposited in place not more than forty-five (45) minutes after water is added when the temperature of the concrete exceeds 85 Degrees F. Certified, public weighmaster tickets shall be delivered to the Engineer or his representative in the field prior to placing the concrete to which the ticket applies.

2.16 CONSISTENCY.

The quantity of water required for proper consistency of the concrete shall be determined by the slump test, in accordance with ASTM C 143. Unless otherwise stated, slump allowances shall be as follows:

Vertical Wall Sections, Columns. - Maximum four (4) inches (+ -) one (1) inch.

Floor Slabs, Beams, Footings. - Maximum three (3) inches (+ -) one-half (1/2) inch.

2.17 RETEMPERING.

Retempering of concrete which has partially hardened: that is, mixing with or without additional cement, aggregate, or water, will not be permitted.

2.18 DEPOSITING.

Concrete shall not be placed until the forms and reinforcement have been approved by the Engineer. Concrete shall be conveyed from the mixer to the place of final deposit as rapidly as possible by methods which will prevent the separation of loss of ingredients. It shall be deposited in the forms as nearly as practicable in its final position with lifts not over one and one-half (1 1/2) feet high, so as to maintain a plastic surface approximately horizontal. Concrete shall not be dropped more than eight (8) feet unless a suitable chute or tube is used. Forms for walls, or other sections of considerable height, shall be provided with openings, or other devices shall be used which will avoid accumulations of hardened concrete on the forms or metal reinforcement. Under no circumstances shall concrete that has partially hardened be deposited in the work. Temporary joints shall not remain exposed for more than forty-five (45) minutes before adjacent concrete is placed. Concrete shall be continuously inspected by the inspector, who shall be afforded an opportunity to check the forms for accuracy, cleanliness and position of reinforcing before the placing is started. Concrete shall not be placed in the forms unless the Engineer has been notified twenty-four (24) hours in advance of concrete placement.

2.19 SUBGRADE PREPARATION.

Subgrade for slabs over native earth or fill shall be finished to exact location and section of bottom of slab and shall be maintained in a smooth, compacted condition, until concrete is placed. Subgrade shall be thoroughly moistened but not muddy, at time concrete is placed.

2.20 COMPACTING.

Concrete, during and immediately after depositing shall be thoroughly worked around the reinforcement and embedded fixtures and into corners of the forms. Internal vibrators shall be used for all walls, and self-supporting beams or slabs. Vibrators shall be handled by experienced workmen and care shall be taken to avoid separation of aggregate due to over vibration. At least one (1) vibrator shall be used for each fifteen (15) cubic yards per hour of concrete placed. Standby vibrators shall be kept on hand.

2.21 CONSTRUCTION JOINTS.

Concrete in each unit of construction shall be placed continuously, and the Contractor shall not be permitted to begin work on any part unless his facilities and forces are sufficient to complete the unit without interruption. All joints in concrete shall be located as indicated on the drawings and as approved by the Engineer. The Contractor shall submit to the Engineer for approval, drawings marked to show the location and sequence of pours.

All construction joints shall be made as watertight as possible. A waterstop shall be provided where called for on the drawings or where deemed necessary by the Engineer. Where these methods fail, the joint shall be grouted under pressure after the concrete has set and forms have been removed.

The surface of construction joints in any location shall be thoroughly cleaned and roughened by dry method sandblasting to remove all laitance and expose aggregate solidly embedded in the mortar matrix.

2.22 BONDING.

Before new concrete is deposited on or against concrete which has set, the forms shall be retightened, the surface of the set concrete shall be roughened, thoroughly cleaned of foreign matter and laitance as specified under Section 2.21 “Construction Joints,” and sprayed with water so that the concrete is saturated but no free water is left on the surface. The new concrete placed in contact with hardened or partially hardened concrete, shall contain an excess of mortar to insure bond. To insure this excess mortar at the juncture of the hardened and newly deposited concrete on vertical and inclined surfaces, the cleaned and saturated surfaces of the hardened concrete shall first be slushed with a coating of neat cement grout against which the new concrete shall be places before the grout has attained its initial set. For horizontal surfaces, a layer at least one (1) inch thick of cement mortar composed of one (1) part cement and two (2) parts sand shall be placed before depositing the concrete.

2.23 CURING.

(a) Water Curing. - Uniformed concrete surfaces shall be covered with wet burlap mats as soon as the concrete has sufficiently set, and shall thereafter be kept wet under wet burlap until backfilled or for fourteen (14) days after the concrete is placed. Where drying conditions are severe, as determined by the Engineer, fog sprays shall be employed to prevent checking of the fresh concrete surface. Immediately following the first leveling, the fog spray will absorb moisture and shall be discontinued when the applied moisture is rejected. Fog spraying shall be continued as specified until the finished surface has attained sufficient strength to permit flooding or covering with burlap mats.

Formed surfaces, both interior and exterior, shall be water cured under burlap mats or by water sprays beginning as soon as the forms are stripped. Prior to stripping of forms, the concrete shall be kept moist by the water sprays.

(b) Curing Compounds. - With the approval of the Engineer, concrete surfaces may be cured by curing compound as defined below. Any concrete curing compound shall be of a nature and composition not deleterious to concrete, and thinned to a working consistency either with a volatile solvent or by emulsification with water. The curing compound shall be of a standard and uniform quality ready for use as shipped by the manufacturer.

Curing compound shall form a continuous, unbroken membrane which shall adhere to moist concrete and which will neither disintegrate, check, peel from the surface, nor show signs of such deterioration within thirty (30) days after application under actual working conditions. The compound shall be sufficiently transparent and free from color that there will be no permanent change in the color of the concrete. The compound shall contain, however, a temporary dye of sufficient color to make the membrane clearly visible for a period of at least four (4) hours after application. If the Contractor applies a deleterious compound to paint, plaster, gunite, or other surface treatment, the surface shall be thoroughly sandblasted to remove all vestiges of the compound at the Contractor’s expense.

2.24 PROTECTION OF CONCRETE CONSTRUCTION.

All surfaces shall be protected against injury. wheeling, working, or walking on the concrete shall not be permitted during the first seventy-two (72) hours after placing. All slabs subject to wear shall be covered with a layer of sand or other suitable material as soon as the concrete has set, and shall either be cured by the use of a curing compound or shall be kept wet for not less than fourteen (14) days, or shall be kept covered for the same period with Sisalcraft paper or other similar tough water proof paper. All joints between adjacent strips of paper shall be sealed.

No concrete shall be placed during rain; and during such weather, all concrete placed within the preceding twelve (12) hours shall be protected with waterproof canvas or other suitable coverings. These coverings shall be provided and kept ready at hand.

All concrete construction shall be protected from excessive loadings.

2.25 REPAIR AND PATCHING.

After removing forms and before the concrete is thoroughly dry, any poor joints, voids, stone pockets or other defective areas and all tie holes shall be patched. Defective areas shall be chipped away to a depth of not less than one (1) inch with the edges perpendicular to the surface. The area to be patched with a space of at least six (6) inches wide entirely surrounding it shall be wetted to prevent adsorption of water from the patching mortar. The patch shall be made of the same materials and proportions as used for the concrete, except that the coarse aggregate shall be omitted and white Portland cement substituted for a part of gray Portland cement. The amount of mixing water shall be as little as consistent with the requirements of handling and placing.

The mortar shall be thoroughly compacted into place slightly higher than the surrounding surface. After being undisturbed for one to two (1 to 2) hours to permit initial shrinkage, the patch shall be finished to match the adjoining surface.

Tie holes left by the withdrawal of form clamp rods or holes left by removal of snap ties shall be filled solid with mortar. For holes passing entirely through the wall, a plunger-type grease gun or other device shall be used to force mortar through the wall, starting at the back face. When the hole is completely filled, the excess mortar shall be struck off with a cloth, flush with the surface. Holes not passing entirely through the wall shall be filled with a small tool that will permit packing the hole solid with mortar, any excess mortar being struck off flush with the surface.

2.26 PLACING REINFORCING STEEL.

Reinforcing steel, before being positioned, shall be cleaned thoroughly of mill and rust scale or other coating that will destroy or reduce the bond. Reinforcement appreciably reduced in section shall be rejected. Where there is delay in deposition the concrete, reinforcement shall be re-inspected and when necessary, cleaned.

Reinforcement shall be carefully formed as indicated on the drawings. Stirrups and tie bars shall be bent around a pin having a diameter of not less than three (3) times the diameter of the bar. Except where specifically indicated otherwise on the drawings, bends for other bars shall be made around a pin having a diameter of not less than six (6) bar diameters. All bars shall be bent cold. Reinforcing steel shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the drawings shall not be used. Heating of bars will be permitted only when the entire operation is approved by the Engineer.

Reinforcing steel shall be positioned accurately and secured against displacement by using annealed iron wire or suitable clips at intersections and shall be supported by concrete chairs or spacers, or metal hangers.

In slabs, beams, and girders, and walls subject to lateral pressure, splices of reinforcement shall not be made at points of maximum stress without the express approval of the Engineer. Splices, where permitted, shall provide sufficient lap to transfer the stress between bars bond and shear. Adjacent bars shall not be spliced at the same point. The minimum allowable lap at points of maximum stress shall be thirty (30) times the diameter of the larger bar of the splice, but in no case shall the lap be less than eighteen (18) inches.

2.27 FORM MATERIAL.

The following classification shall be used for all concrete form work:

Class I. - For permanent exposed concrete surfaces where architectural appearance is important. Class I forms shall be constructed with particular care to assure a high type of architectural finish of uniform texture free from visible irregular ties, patch marks and discoloration's. Forms shall be of synthetic resin bonded plywood specially made for concrete work or non-warping hardboard. The entire surface shall be lightly sanded if necessary.

Class II. - For un-plastered interior of all rooms and for all surfaces in contact with water, such as interior walls of channels and tanks. These forms shall be of hardboard, steel or waterproof synthetic resin bonded plywood specially made for concrete work.

The Contractor will be permitted to use the most advantageous panel sizes and panel joint locations. Class II forms for painted concrete surfaces shall be free of all surface imperfections. Neat patches and minor surface imperfections will be permitted in forms for unpainted concrete provided the finished surface conforms to the requirements specified hereunder.

Class III. - For formed surfaces not exposed to view such as footings, backfilled walls and pipe trenches. These forms shall be of metal or of smooth planed boards in good condition, free from large or loose knots.

2.28 FORM CONSTRUCTION.

Exposed edges of concrete on the outside of structures and all those in the inside of structures shall be chamfered or beveled at an angle of 45 degrees, bevel being one (1) inch on a side. If so directed by the Engineer, however, the Contractor shall provide square edges for any portion of the work.

All dirt, chips, sawdust and other foreign matter shall be removed from within the forms before any concrete is deposited therein. Forms previously used shall be thoroughly cleaned of all dirt, mortar and foreign matter before being used. Before concrete is deposited within the forms, all inside surfaces of the forms shall be thoroughly coated with an approved oil.

Bolts, rods or single wires shall preferably be used for internal ties, and if so used, shall be so arranged that when the forms are removed, no metal shall be within one (1) inch of any surface. Twisted wire ties will not be permitted in the forms for any wall later to be subjected to water pressure. The Contractor shall take due precaution to prevent future leakage or seepage along ties in all walls which will be subjected to water pressure. Ties used in all such walls must be cut back into the face of the wall at least one (1) inch and the resulting holes pointed up with one to three (1:3) mortar.

Temporary openings shall be provided at the base of the column and wall forms and at other points where necessary to facilitate cleaning and inspection before depositing concrete.

Forms, bracing and shores shall be kept in place until removal is approved by the Engineer and in no case shall removal commence earlier than the following schedule:

Sides of footings and rafters		1	days
Walls above ground		3	days
Walls below ground		7	days
Columns	10	days	
Slabs		14	days
Beams		21	days

Members subject to additional loads during construction shall be adequately shored to support both member and construction loads in a manner that will protect member from damage.

2.29 FINISH OF FORMED SURFACES.

All finished or formed surfaces shall conform accurately to the shape, alignment, grades and sections as shown on the drawings or prescribed by the Engineer. Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing or roughness of any kind, and shall present a finished, smooth, continuous, hard surface. All sharp angles, where required, shall be rounded or beveled.

In case of floor and flat roof surfaces where drains are provided, all exterior concrete floor, sidewalk and flat surfaces, the Contractor shall be particularly careful to provide and adequate slope to the drains or to suitable points of disposal. The direction of slope and the amount of crowning generally are shown on the drawings, otherwise they shall be subject to the approval of the Engineer.

Where Class I forms are required, the surface of the concrete shall be given the following finish: After wetting the surface, a grout shall be rubbed in using a rubber float or burlap. The grout shall be made by mixing one (1) part of cement and one and one-half (1 1/2) parts of fine sand with sufficient water to give it the consistency of thick paint. After the grout hardens sufficiently, it shall be scraped from the surface with the edge of a steel trowel without disturbing the grout in the air holes. After further drying, the surface shall be rubbed with burlap to remove all surface grout. The entire surface shall be finished to secure a uniform texture.

2.30 FINISH OF SLABS.

(a) **Wood Float Finish. -** The forms shall be completely filled with concrete with as little working as possible. All high or low spots exceeding one-fourth (1/4) inch in ten (10) feet shall be eliminated. The surface shall then be wood-floated until it is smooth and free from blemishes.

(b) **Broomed Finish. -** Surfaces to receive a broomed finish shall be wood-floated as specified above, followed by steel troweling. After steel troweling and before initial set, the surface shall then be slightly roughened by means of a broom or a burlap mat to produce an even textured surface finish.

2.31 INSERTS.

Where pipes, castings or conduits are to pass through the walls, the contractor shall place such pipes or castings in the forms before pouting the concrete, or in special cases, with the express consent and approval of the Engineer or as specified herein, shall build approved boxes in the forms to make openings for subsequent insertion of such pipes, castings, or conduits. To withstand water pressure and to insure watertightness around the openings so formed, the boxes or cores shall be provided with continuous keyways all the way around, and shall have a slight flair to facilitate grouting and the escape of entrapped air during grouting. The grout shall contain Embeco or similar material and shall be mixed and placed in accordance with manufacture's instruction.

Additional reinforcement shall be provided around such openings, if large, to meet the approval to the Engineer. The pipes, castings, or conduits, as specified, shall be grouted in place by pouring in grout under a head of at least four (4) inches. The grout shall be poured, rammed or joggled into place to fill completely the space between the pipes, castings, or conduits, and the sides of the openings, so as to obtain the same watertightness as through the wall itself. The grouted castings shall then be water cured. The grouting material so placed shall be surfaced when the forms are removed to give a uniform appearance to the wall if such wall will be exposed to view.

The Contractor shall set accurately and hold in exact position in the forms until the concrete is poured and set, all gate frames, gate thimbles, special castings, channels, or other metal parts that are to be embedded in concrete, and shall furnish and set accurately all inserts and anchor or other bolts necessary for the attaching of piping, valves, metal sash, and equipment. All nailing blocks, plugs, strips and the like, necessary to the attachment of trim, finish, and similar work, and all wires for suspending ceilings will be furnished and placed by the Contractor.

2.32 GUNITE.

When the Contractor elects or the Engineer specifies the use of gunite, the Contractor shall furnish and install such gunite according to the special technical provisions of the specifications.

2.33 PRESTRESSED CONCRETE.

When prestressed construction is specified by the Engineer, or is submitted as an acceptable alternate by the Contractor, it shall be according to the special technical provisions of these specifications.

2.34 MISCELLANEOUS CONCRETE MIXES.

Miscellaneous concrete mixes shall be as listed as follows:

Use	28 - day Strength	Mix
Grout	2,000	Seven (7) sack Portland cement with pea gravel.
Mortar	1,800	One (1) part Portland cement, one-fourth (1/4) to one half (1/2) part hydrated lime or lime putty, aggregate not less than two and one-fourth (2 1/4) and not more then three (3) times the sum of the volumes of the cement and lime used.
Coarse grout for filling masonry blocks and for bond beams	2.000	One (1) part Portland cement to which may be added not more than one-tenth (1/10) part hydrated lime or lime putty, and two (2) to three (3) parts sand, and not more than two (2) parts pea gravel.

2.35 COLD WEATHER REQUIREMENTS.

Adequate equipment shall be provided for heating the concrete during freezing or near freezing weather. No frozen materials or materials containing ice shall be used.

All concrete materials and all reinforcement, forms, fillers and ground which the concrete is to come in contact with shall be free from ice and frost. Whenever the temperature of the surrounding air is below 40 degrees F, all concrete placed in the forms shall have a temperature between 70 degrees F and 80 degrees F and an adequate means shall be provided for maintaining a temperature between 50 degrees F and 80 degrees F during the curing period.

The housing, covering or other protection used in connection with curing, shall remain in place and intact at least twenty-four (24) hours after the artificial heating is discontinued. The use of salt or chemicals for the prevention of freezing is prohibited.

When heating of concrete materials in required, the mixing of water and aggregate shall be heated to not more than 90 degrees F prior to being placed in the mixer, so that the temperature of the mixed concrete shall not be less than 70 degrees F not more than 80 degrees F. Aggregates shall be heated either by steam or by dry heat, and the heating apparatus shall be of a type which will heat the mass uniformly and in such a manner as to preclude areas, or hot spots, which will burn the material. Flame throwers, or other, similar direct heating devices will not be allowed.

SECTION 3
PIPELINE MATERIALS AND SPECIFICATIONS

3.1 GENERAL.

This portion of the work shall include the furnishing and installation in conformance with the plans and specifications, true to line and grade, and free from leaks, cracks, and obstructions. Where choices are allowed, the Contractor shall select such materials and construction methods as will result in a satisfactory completed project. Materials and equipment used in the work shall be **New** and **Unused** unless otherwise specified. In case a reference is not clear as to which of several grades is desired, the highest quality material shall be used. Materials and strength of pipe shall be as shown on the plans. Unless two (2) or more materials are approved as equals, the Contractor shall not substitute another material for the one specified.

3.2 VITRIFIED CLAY PIPE (VCP) AND CLAY FITTINGS

3.2.01 Materials. - Vitrified Clay Pipe (VCP) and Clay Fittings shall be extra strength, durable, first quality, well-burned clay pipe in accordance with the Western Regional Standards of the National Clay Pipe Institute. Crushing strength shall be determined by the three (3) edge bearing method of ASTM C 301, and hydrostatic testing shall be at ten (10) psi as described in the Clay Pipe Engineering Handbook.

Each pipe and fitting shall be marked with the name of the manufacturer or his trademark.

The Engineer or Inspector may reject any pipe or fitting which contain excessive dimensional distortion as defined by the West Coast Standards of the National Clay Pipe Institute, foreign matter fused into the pipe, breaks which would affect the watertightness of the pipe and cracks which extend through the entire thickness of the pipe barrel.

3.2.02 COMPRESSION JOINT FOR VCP.

(a) Molded Compression joint. - When molded compression-type joints are used to join VCP, the joint shall be manufactured in accordance with ASTM C 425. The joints shall be "Wedge-Lock," Speed Seal," or approved equal.

(b) Mechanical Compression Joint. - When mechanical compression-type joints are used to join VCP, the joint shall be manufactured in accordance with ASTM C 594, "Test Condition II." The joint shall be as manufactured by Mission Clay Products Corp., "Band-Seal Type II Mainline Joint," with a stainless steel shear ring, or approved equal.

3.2.03 Hot-pour Joints. - Hot-pour joints will not be permitted.

3.3 ASBESTOS-CEMENT SEWER PIPE (ACP). - Due to the carcinogenic properties of asbestos fibers. Asbestos Cement pipe shall not be used in sanitary sewer systems.

3.4 REINFORCED PLASTIC MORTAR PIPE (RPM).

(Not permitted)

3.5 CAST-IRON PIPE (CIP) SEWER MAIN AND LATERAL.

All cast-iron pipe shall be Class 22, Class 23, or Class 24, manufactured in accordance with American National Standards Institute, Inc. Standards ANSI Specification A 21.6 and Federal Specification WW-P-421. Cast-iron pipe may, at the Contractor's option have mechanical joints or be jointed by the use of one hundred twenty-five (125) pound ANSI flanges or Victaulic-type couplings. Where flexibility of joints is a factor, such as at connection between inside and outside piping, a flexible-type joint such as Victaulic-type couplings shall be used.

3.5.01 Flanged Joints. - Bolts, nuts and washers for flanged joints shall conform to the recommendations of the pipe manufacturer and shall be uniformly tightened. Ring gaskets shall be one-sixteenth (1/16) inch rubber or neoprene lubricated and installed in accordance with the manufacturer's recommendations.

3.5.02 Mechanical Joints. - Mechanical joints shall consist of a stuffing box into which an endless rubber ring is compressed by a follower gland. The gasket must be fully confined and under constant compression. Mechanical-joint pipe shall be installed in accordance with manufacturer's recommendations. Gasket shall conform to American National Standards Institute Specification A 21,11.

3.5.03 Victaulic-type Couplings. - Cast-iron pipe for Victaulic-type couplings shall have either grooved or shouldered ends. An endless rubber gasket of C-shaped cross section shall be used in each coupling. Couplings shall be installed in accordance with manufacturer's recommendations.

3.6 POLYVINYL CHLORIDE (PVC) SEWER MAIN AND LATERAL.

3.6.01 Scope. - Polyvinyl Chloride (PVC) sewer pipe material for sizes up to and including twelve (12) inch diameter pipe.

3.6.02 Material. - Pipe and fittings shall be made from PVC compound as defined in ASTM D 1784. Pipe and fittings shall meet the requirements of ASTM D 3034 with the following exception:

All pipe and fittings shall have rubber joints capable of withstanding an internal pressure conforming to pipe manufacturer's recommendations. The rubber ring shall be made of a natural or synthetic rubber base compound, conforming to the requirement of ASTM D 1869. The compound shall be resistant to acids, alkalies, solvents and greases encountered in sanitary sewers. Solvent weld connections will be allowed only for end caps, repairs, saddles, and factory-fabricated fittings.

The pipe shall have a minimum "pipe stiffness" of F/Y=46 measured at five percent (5%) deflection.

This pipe stiffness shall be measured in accordance with ASTM Designation D 2412, Test for External Loading Properties of Plastic Pipe by Parallel-Plate loading. The pipe shall have a maximum Standard Dimension Ration (SDR) of thirty-five (35).

3.6.03 Fittings. - All fittings and accessories shall be as manufactured and furnished by the pipe suppliers or approved equal.

3.6.04 Installation. - Pipe and fittings shall be delivered and installed in accordance with the pipe manufacturer's recommendation and ASTM D 21321, except only Class I, II, and III embedment materials will be considered suitable for PVC installations. PVC sewer pipe shall not be installed where soil conditions preclude a firm stable trench wall.

3.6.05 Connections to Concrete Structures. - Connections to concrete structures, such as manhole bases, shall be watertight. An asbestos-cement connection coupling, as approved by the Engineer, shall be precast directly into the manhole base so that the PVC sewer pipe is not in contact with the concrete, thus providing a flexible joint.

3.6.06 Allowable Vertical Deflection. - The allowable initial (after backfilling and compaction) vertical deflection shall not exceed five percent (5%) of the average inside diameter of the pipe in an unloaded condition.

Due to the flexible characteristics of PVC pipe, the Contractor may have to exceed the specification requirements for backfill material and minimum depths on rigid pipes. Any additional costs incurred for the installation of flexible pipe shall be borne by the Contractor.

3.6.07 Testing. - Testing shall be done in accordance with Sections 3.8 and 6.0 of these specifications.

3.6.08 Marking. - Each length of pipe shall be marked at least once by the manufacturer, with trade name, lot identification, nominal size, the ASTM number, and the type and grade.

3.7 ACRYLONITRILE BUTADIENE STYRENE (ABS) SEWER MAIN AND LATERAL.

3.7.01 Scope. - Acrylonitrile butadiene styrene (ABS) truss pipe as herein specified is defined as an internally braced, double-wall pipe for use in gravity sanitary sewers. Six (6) inch diameter and smaller shall be solid-wall pipe.

3.7.02 Material. - Truss sewer pipe shall be manufactured by extruding ABS thermoplastic into a truss with inner and outer walls connected by webs.

The pipe and joints shall conform to the requirements of ASTM D 2680.

3.7.03 Joints. - Chemically welded joints shall be made in conformance with the pipe manufacturer's recommendations. Both a primer and a cement shall be of the composition recommended by the manufacturer. The primer and cement shall be of the composition recommended by the pipe manufacturer.

3.7.04 Physical Requirements. - The tests contained herein are quality-control tests. Pipe meeting these quality-control requirements will be acceptable for use in sanitary sewers.

(a) Truss Pipe. - A six (6) inch long piece, when tested by ASTM D 2412, shall equal or exceed the following values even after twenty-four (24) hours immersion in five percent (5%) solutions by weight of H2SO4 (Sulfuric Acid) when deflection reaches five percent (5%):

Nominal Diameter (Inches)	Minimum Diameter (Inches)	Minimum EL-Lb./In.	F/Y Lb/SqIn.
8	7.75	2,400	200
10	9.75	4,600	200
12	11.75	8,100	200
15	14.75	15,900	200

The F/Y shall be computed by dividing the load in (Lbs./In.) at five percent (5%) by the deflection in inches. Pipe shall not fail when deflected ten percent (10%).

(b) Solid Wall Pipe. - Pipe and joints shall confirm to ASTM 2751-75. The pipe shall have a maximum Standard Dimension Ratio of thirty--five (35).

3.7.05 Couplings and Fittings. - Couplings and fittings shall be manufactured or materials having equal or superior chemical and physical characteristics as the pipe itself. Each solvent weld-type coupling shall be accurately formed so as to have the proper dimension necessary to assure a leak-proof joint. One (1) coupling shall be furnished with each standard length of pipe.

3.9.02 PVC Fittings.

(a) General. - Fittings shall be of the same material as the pipe, and in no case shall have thinner walls than that of the pipe furnished. Where molded fittings are used, they shall be made of NSF-approved material.

Samples of each type of fitting shall be submitted for the Engineer's approval.

The dry fit of fittings and coupling sockets shall be snug. Building up the joint to overcome a loose fit with multiple layers of filler solvent shall not be permitted.

(b) PVC Couplings. - Couplings shall be of the extruded type, designed to be interference fit for at least one-half (1/2) of the socket depth. They shall have a beveled entrance to permit the wiping off of the solvents on male end while being installed. The following will be considered the minimum socket depth for PVC couplings:

Size (Inches)	Socket Depth (Inches)
6	5.000
8	6.000

The wall thickness of the PVC couplings shall be equal to SDR 17 pipe or shall be one-tenth (1/10) of and inch thick, whichever is greater.

(c) Elbows. - Elbows shall be long radius bends with minimum walls equal to that of the pipe joining or shall be one-tenth (1/10) of an inch thick, whichever is greater. Tapered-welding sockets shall be equal to those required for couplings. Standard elbows, as manufactured by NSF Standards, shall be acceptable but are subject to special blocking and bedding at no extra cost, unless deep-socket adapters have been properly installed.

(d) Tees. - Tees shall be a molded fitting with NSF approval. A deep-socked adapter shall be installed in each outlet by the pipe manufacturer or by the Contractor at least twenty-four (24) hours before field installation. The deep-socket adapter shall have a socket depth and wall equal to the coupling.

3.9.03 PVC Welding Solvents. - PVC welding solvent shall be purchased from the manufacturer of the pipe.

The PVC welding solvent shall be compounded to conform with the socked fit and the weather conditions at the time of installation.

3.9.04 PVC Pipe Laying. - The pipe, fittings, and valves shall be placed in the trench with care. Under no circumstances shall pipe or other material be dropped or dumped into the trench. The pipe shall not be dragged in a manner that would cause scratching of the pipe surface. An excessive amount of scratching on the surface of the pipe will be considered cause for rejection.

The pipe shall be snaked into the trench, either employing the natural snaking tendency or the pipe shall be laid from one side to the other on alternate lengths.

3.10 PIPE JOINTS.

Upon the District's request, the Contractor shall furnish for approval, the pipe manufacturer's drawings showing dimensions and manufacturing tolerances of pipe and joint to be used on the work.

3.11 TESTING FREQUENCY AND FINAL ACCEPTABILITY OF PIPE.

The District may call for crushing and hydrostatic testing of up to one-half percent (0.5%) of the total pieces of nonmetallic pipe of each size to be used in the work. If any of these tests fail to meet the tabulated design strength and/or the listed hydrostatic test, the testing frequency shall be increased so that two percent (2%) of the total pieces of each size are being tested for bearing and bursting strength. If consistent failures occur, the entire lot of pipe which the samples represent shall be rejected.

Notwithstanding prior factory or yard inspection, the District shall have the right to reject any damaged or defective pipe found on the job, which in its opinion will affect the durability of the installation, and the District may order its removal from the work.

3.12 INSTALLATION OF PIPELINES.

Pipe laying shall proceed upgrade with the spigot ends of bell-and-spigot pipe pointing in the direction of the flow. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe, following manufacturer's instructions for the specific joining method being used. All pipe and fittings shall be placed in the trench with care.

3.13 Cleanouts.

The pipe for the cleanout shall be of the same size and material as the sewer main. The cleanouts shall be constructed as shown on the District's Standard Drawing No. E-8 and installed at the locations indicated on the plans.

3.14 Tees.

Tees shall be of the same materials as the sewer main, and the longitudinal barrel of the tee shall be of the same size as the sewer main. Tees of the size called for in the plans shall be installed at approximately the locations shown on the plans. The exact location will be determined in the field by the Engineer, to best service the property in question. a suitable plug shall be provided and installed prior to backfilling operations to provide a watertight joint.

The Contractor shall reference each tee connection in the field with a surface marker. The surface marker shall be as specified on the District's Standard Drawing No. E-9 or No. E-10.

3.15 Sewer Laterals.

The sewer laterals shall be constructed as shown on the District's Standard Drawings No. E-9, No. E-10, and No. E-11.

Sewer laterals of the size called for on the plans shall be installed at approximately the locations shown on the plans. The exact location will be determined in the field by the Engineer, to best service the property in question. A suitable plug shall be provided and installed prior to backfilling operation to provide a watertight joint. Sewer lateral and building sewer pipe material shall be as specified in Section 3, "Pipe Line Materials and Installation," of these specifications.

The Contractor shall reference each sewer lateral connection point in the field with a surface marker. The surface marker shall be as specified on the District's Standard Drawing No. E-9 and E-10.

Sewer laterals in waterways, easement, and deep cuts should have the house sewer service brought to a minimum depth of five (5) feet. Sewer laterals in waterways will be constructed of cast iron exclusively, cast iron construction will extend up and out of the waterway ten (10) feet, or too the One-Hundred Year (100) flood level.

3.16 Bedding.

Unless otherwise called for in the plans and specifications, "normal bedding" material to provide special or normal bedding shall mean coarse granular material acceptable to the Engineer with a maximum particle size of 1/2 - Inch. Reference is made to Standard Drawing No. E-18.

Plastic pipe shall be bedded as shown in the following table:

Type of Pipe	Depth of Cover in Feet	Bedding Required
traffic	less than 4	Concrete blanket per Standard Drawing E-19 for or Special Design
Solid Wall (ABS and PVC) 4-Inch to 15-Inch size	4 to 17	Crushed rock bedding to spring line of pipe
	17 to 30	Concrete cradle per Standard Drawing E-18
	Greater than 30	Special Design

traffic	Less than 4	Concrete blanket per Standard Drawing E-19 for or Special Design
ABS composite 8-Inch or larger	4 or 9	Normal bedding per Standard Drawing E-18
or		
ABS solid wall 4-Inch to 6-inch diameter	9 to 20	Crushed rock bedding to spring line
	20 to 30	Encasement per Standard Drawing E-18 or
	Greater than 30	Special Design

3.17 Excavation and Backfill.

The Contractor is directed to section 1, “Earthwork,” of these specifications for all items pertaining to excavation and backfill.

3.18 Pavement Removal and Replacement.

The Contractor is referred to Section 8, “Removal and Replacement of Paved Surfaces,” of these specifications.

3.19 Leakage Tests.

Leakage tests shall be in accordance with Section 6, “Cleaning and Testing,” of these specifications.

3.20 Pipeline in Casing.

The Contractor is referred to Section 5, “Concrete Blankets and Conductor Pipe,” of these specifications.

3.21 Pipe Joint Deflections.

Short lengths of pipe shall be required to make curved alignments of the sewer without exceeding the manufacturer’s recommendations for joint deflections.

3.22 Grease Interceptors.

Need for and sizing of, will be determined through the “Feasibility Study” process for new installations. In all installations, clear visibility, from above, of both the inlet and outlet pipes will be provided for by incorporating standard manhole ring and covers in the design. Sizing may be recommended by the “Feasability Study” but will be set by San Bernardino County, Department of Environmental Health Services.

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SECTION 4
MANHOLES AND CLEANOUTS

4.1 GENERAL

All manholes shall be constructed in conformance with the District's Standard Drawing No. E-18, No. E-2, E-6. All such structures shall be built into the sewer lines at the locations shown on the plans. Pipe for future lateral sewer lines shall be built into the structures as shown on the plans, and the outer ends closed with a cap securely fixed in place. The caps shall be so fixed as to be easily removed in the future and shall be watertight.

4.2 PRECAST MANHOLES.

Precast manhole sections will be manufactured in a plant designed for this type of work. All units will conform to the details on the above-referenced drawings with eccentric cone top sections. Concrete used in the precast section shall be manufactured of approved and selected materials in such proportions as per Section 2, "Concrete Construction," of these specifications, with a minimum compressive strength of 3000 psi. Sections will be compacted by vibration or centrifugal force and steam, sprinkling, membrane solution or a combination of these methods. Manholes shall conform with ASTM C 478.

4.2a PREFABRICATED ABS MANHOLES.

Prefabricated ABS manholes will be manufactured in a plant designed for this type of work. All units will confirm to the details on the above-referenced drawings. Installation will be per manufactures recommendations. Bedding will be Class 1: angular, 1/2 to 3/4 inch maximum size, well graded crushed stone, coal, slag, cinders or crushed shells (ASTM D 2321 allows the use of such large sizes in not consistent with the requirements for uniform haunching and embedment, particularly for small pipe).

4.3 MANHOLE BASE.

Manhole bases shall be monolithic construction of Class IV concrete and shall be poured to the size, line and grade as shown on the standard drawings and plans. Drop-manhole bases shall be constructed as detailed on the District's Standard Drawing E-2. The Contractor is referred to Section 2, "Concrete Construction," of these specifications.

In laying the pipe up to structures, no pipe shall be allowed to project beyond the inside of the wall of the structure. Flexible joints shall be provided in all sewer pipes outside of manholes, but within twelve (12) inches of concrete base. If required by district engineer.

A notch or groove confirming to the precast manhole section shall be formed on top of the base section.

4.4 PRECAST MANHOLE JOINTS.

Precast manhole sections shall be tongue and groove alternately on both ends of the sections, and shall be laid with the grooved portion facing up. Each section shall be set to enable the manhole to rise vertically above the base.

A concrete waterproof mortar shall be placed on the top of each ring, completely covering the grooved portion prior to the installation of the next precast section. Excess mortar shall flow out equally on both sides of the joint for the complete circumference of the ring. Finish mortar joint should have a minimum thickness of one-fourth (1/4) inch.

Mortar shall consist of one (1) part by volume of cement and three parts by volume of sand. Mortar shall be mixed in a suitable mixer in a watertight mixing box. The materials must be thoroughly mixed dry until the mass assumes a uniform color and then sufficient water should be added to bring the mixture to a workable consistency. No mortar which has begun to set shall be used and no retempering thereof will be permitted. Mortar shall conform to Section 2.34 of these specifications.

4.5 GRADE RINGS.

Precast grade rings shall be used to reach desired height of the manhole cover ref. drawing E-2. A maximum vertical adjustment using grade rings is twenty (20) inches, adjustments greater than this require the replacement of a barrel section. Minor adjustment to the ring and cover shall be made by the use of "Shims" under the frame. Grade rings are not required for manholes constructed in easements unless needed for adjustment to finish grade.

4.51 HIGH DENSITY POLYETHYLENE GRADE RINGS

High density polyethylene grade rings used in lieu of precast concrete ring must be approved by the district engineer before installation. The adjustment rings shall be manufactured from polyethylene plastic as ASTM Specification D-4976. The material properties shall be tested and qualified for use per the ASTM test method referenced in the above ASTM standard. The annular space between the rings and cone basin, the rings, and the rings and cover frame shall be sealed utilizing an approved butyl sealant. All adjustment for matching road grade shall be made utilizing a molded and indexed slope ring.

4.6 MANHOLE STEPS.

Manhole steps will not be allowed except for manholes constructed within the City of Big Bear Lake where steps are required

4.7 **BRICK MANHOLES.** Brick manholes are not acceptable for new construction.

4.8 **CLEANOUTS.**

Cleanouts shall be constructed as shown on the District's Standard Drawing No. E-15, and in conformance with the notes contained therein.

4.9 **CASTINGS.**

All castings shall be of tough gray iron, free from cracks and swells. The iron shall conform to the requirements of ASTM A 48, Class 30.

4.9.01 Manhole Frames and Covers. - Manhole frames and covers to be constructed in easements shall be Long Beach Iron Works No. X 103 D, or approved equal. All other frame and covers shall be Long Beach Iron Works No. X-106E, or approved equal. In no case shall the diameter of a manhole be less than twenty four (24) inches, inside diameter. Covers shall be diamond tread finish and shall be provided with a "lifting receptacle" per District's Standard Drawing No. E-5. All frames and covers are to be machined to fit (non-rocking).

4.9.02 Cleanout Frames and Covers. - Cleanout frames and covers shall be Long Beach Iron Works No. X-508B, or approved equal. Covers shall be diamond tread with the letter "S" stamped or integrally cast into the cover.

4.9.03 Nameplate. - The nameplate on each and every sanitary sewer manhole cover shall read as follows: "Sanitary Sewer."

4.9.04 Bolt-Down Frames and Covers. - Manhole frames and covers shall be drilled to match. Covers shall be counter bored to accept standard socket wrench and permit bolt heads to be flush with cover.

SECTION 6
CLEANING AND TESTING

6.1 GENERAL.

It is the intent of the plans and specifications that the completed sewer pipes of all types, along with manholes and other appurtenances, shall be watertight and clean.

6.2 INFILTRATION AND EXFILTRATION TEST.

Each section of sewer between two (2) successive manholes shall be tested for leakage or, at the option of the Engineer, for infiltration. In general, the leakage test shall be made on all sections of sewer except those where, in the Opinion of the Engineer, excessive ground water is encountered, the infiltration test shall be made.

Even though a section may have previously passed the leakage or infiltration test, each section of sewer shall be tested subsequent to the last backfill compacting operation in connection therewith, and upon approval and acceptance of necessary soils tests; wherein, in the opinion of the Engineer, heavy compaction of the Contractor or others may have damaged or affected the required watertight integrity of the pipe, structure, and appurtenances. The Contractor shall furnish all materials required for the tests and bear all costs in connection therewith. Tests shall be made in the presence of the Engineer.

If the exfiltration or infiltration rate as shown by the tests specified herein is greater than the amount specified, the pipe joints shall be repaired or, if necessary, the pipe shall be removed and re-laid by the Contractor at his expense. The sewer will not be considered acceptable until the leakage or infiltration rate, as determined by the test, is less than the allowable.

Air testing described in Section 6.3 may be used in lieu of water testing when approved by the District.

Exfiltration Test (water test)

Unless excessive ground water is encountered, each section of sanitary sewer, between two (2) successive structures, shall be tested by closing the lower end of the sewer to be tested and the inlet sewer of the upper structure with plugs or stoppers, and filling the pipe and structure with water to a point four (4) feet above the invert of the open sewer in the upper structure.

Where the difference in elevation between the invert of the upper structure and the invert of the lower structure is more than fifteen feet, an air test per Section 6.3 hereof shall be used in lieu of the water test.

The total leakage shall be the decrease in volume of water in the upper structure. The leakage shall not exceed four-tenths (0.40) gallons per two (2) hour test period per inch of nominal diameter of pipe per one hundred (100) feet of sewer pipe being tested.

If the leakage, as shown by the test, is greater than allowed, the pipe shall be overhauled and, if necessary, replaced and re-laid until the joints and pipe shall hold satisfactorily under this test. All tests must be completed before street or trench is resurfaced, unless otherwise directed by the Engineer. The Contractor shall furnish all labor and materials for making the tests required, at his own expense.

Infiltration Test

If, in the construction of a section of the sewer between structures, excessive ground water is encountered, the test for leakage described above shall not be used, but instead, the end of the sewer at the upper structure shall be closed sufficiently to prevent the entrance of water. Pumping of ground water shall be discontinued for at least three (3) days after which the section shall be tested for infiltration. The infiltration shall not exceed four-tenths (0.40) gallons per two (2) hour test period per inch of diameter, per one hundred (100) feet of main line sewer being tested, and does not include the length of house laterals entering that section. Where any infiltration in excess of this amount is discovered before completion and acceptance of the sewer, the sewer shall be immediately uncovered and the amount of infiltration reduced to a quantity within the specified amount of infiltration before the sewer is accepted, at the expense of the Contractor. Should, however, the infiltration be less than the specified amount, the Contractor shall stop any individual leaks that may be observed when ordered to do so by the Engineer. The Contractor shall furnish all labor, materials, equipment and water for making the test required, at his own expense. All tests must be completed before street or trench is resurfaced, unless otherwise directed by the Engineer.

6.3 AIR TESTING.

The Contractor shall test all sewers that cannot be tested hydrostatically by means of the air test specified herein, unless otherwise directed by the Engineer. The length of the line tested at one time shall be limited to the length between adjacent manholes. Air test procedure shall be as follows;

Pressurize the test section to four (4) psi and hold at four (4) psi for not leas than two (2) minutes. Add air if necessary to keep the pressure at four (4) psi. Disconnect air supply. When pressure decreases to three and one-half (3.5) psi, start stopwatch. Determine the time in seconds that is required for the internal pressure to reach two and one-half (2.5) psi. This time interval shall be greater than time given in the following table. The section of pipe shall not have passed if the time is less than shown. Release air from the opposite end of the section.

Sewer Size (in Inches)	Minimum Time (in Seconds)	Minutes & Sec.
4	113	1-53
6	170	2-50
8	226	3-46
10	283	4-43
12	340	5-40
15	425	7-5
18	510	8-30
21	595	9-55
24	680	11-20

When the prevailing ground water is above the sewer being tested, air pressure shall be increased forty-three hundredths (0.43) psi for each foot the water table is above the flow line of the sewer.

If the test is not passed, the leak shall be found and repaired to the satisfaction of the Engineer.

Sewer Building laterals shall be considered part of the MAIN sewer lateral to which they are connected and no adjustment of test time shall be allowed to compensate for the smaller diameter of the house sewers sewer lateral.

The pressure gauge used shall be supplied by the Contractor, shall have minimum divisions of one-tenth (0.10) psi, and shall have an accuracy of four hundredths (0.04) psi. Accuracy and calibration of the gauge shall be certified by a reliable testing firm at six (6) month intervals or when requested by the Engineer.

When the air-pressure test is used for testing of the pipe, the manholes shall be water tested. Each manhole shall be filled with water four (4) feet above flow line of the manhole with the inlet and outlet of each manhole plugged. The maximum leakage rate shall be ten (10) gallons per hour per manhole test to be run for a minimum of thirty (30) minutes.

6.4 TESTING - FORCE MAIN.

After trenches are backfilled and compacted, the force main shall be subjected to a hydrostatic pressure test of the specified operating pressure for the class of pipe to be tested for a period of four (4) hours.

Care shall be taken to expel all air from the pipe line as the line is filled with water for the test. The water necessary to maintain this pressure shall be measured by means satisfactory to the Engineer. The leakage shall be considered as the amount of water entering the pipe during the test, less the measured leakage through the valves and bulkheads. Leakage shall not exceed the rate of twelve (12) gallons per inch of diameter per twenty--four (24) hours per mile of pipe. Any noticeable leaks shall be stopped and any defective pipe shall be repaired or replaced with new sections and retested as specified above before final approval and acceptance of the work by the Engineer. All labor, materials, equipment and water for tests, shall be furnished by the Contractor.

6.5 CLEANING.

Prior to putting any sewer into service, or before final acceptance, all sewer facilities shall be visually checked and all foreign objects, materials or obstructions removed from the facilities. If dirt, silt or other materials are found, the Engineer may require that the facilities be cleaned by flushing, balling, rodding or other means so that the materials may be removed from the system.

6.6 PIPE TESTING.

Tests of pipe for strength, straightness and durability shall be as required in Section 3, “Pipe Line Materials and Installation,” of these specifications.

6.7 TESTING OF FLEXIBLE SEWER PIPE.

All sections of pipe shall be tested for water-tightness in accordance with Sections 6.2 and 6.3 of these specifications, after installation has been completed.

Prior to the above test, all sections shall be subject to a deflection performance test as follows:

All flexible sanitary sewer pipe (PVC and ABS, etc.) shall be tested for excessive deflections after back-fill has been placed and compacted but before leak testing and final paving operations.

A rigid mandrel, with a circular cross section having a diameter of at least ninety-five percent (95%) of the specified average inside diameter, shall be pulled through the pipe by hand. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. Obstructions encountered by the mandrel shall be corrected by the Contractor. All material, equipment and labor to perform the test shall be provided by the Contractor at no cost to the Owner.

The testing device shall be pulled through the completed pipe lines. If the device sticks in the pipe at any point, the pipe shall be repaired and retested. For acceptance, the device must pass through the entire section of line between structures in one pass without the use of excessive force.

6.8 TELEVISION INSPECTION.

For projects that exceed 5,000 lineal feet of main line pipe, television inspection shall be performed as described herein: All newly installed commercial 6" and larger sewer laterals will have a television inspection performed.
The Contractor shall secure the services of a firm or agency for viewing and recording on video tape, newly installed sewer pipelines. The total length of pipeline to be inspected by television shall be one hundred percent (100%).

Any defective pipe detected by the television inspection shall be removed and replaced by the Contractor, and an additional section of the sewer main between manholes shall be added to the total length of pipeline to be tested. Television testing shall include (1) a verbal tape describing the condition of the pipe inspected at various locations along the pipeline and (2) a digital readout of the locations of all laterals or tees.

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SECTION 7
EROSION CONTROL SEEDING

7.1 GENERAL.

The Contractor shall provide erosion-control measures as defined herewith on all areas where the natural vegetation has been disturbed by the installation of sanitary facilities. If a ground cover other than natural vegetation has been disturbed, this section does not apply and the Contractor shall replace said ground cover in kind.

7.2 PREPARATION.

After the backfill has been compacted and the pipeline tested, the Contractor shall remove and dispose of rocks and debris from the area to be reseeded. No seeding shall be performed during windy weather or when the ground is too wet or in an untillable condition. The fertilizer and seed shall be spread before the straw cover material is applied. Commercial fertilizer shall not be applied until after the seed has been sown.

7.3 MATERIAL.

Materials shall consist of the following:

7.3.01 Seed. - The seed shall consist of the following mixture: Crested Wheatgrass, forty-seven percent (47%); Intermediate Wheatgrass, twenty-seven percent (27%); Wimmera Ryegrass, thirteen percent (13%); Blando Ryegrass, thirteen percent (13%). The seed shall be spread at the rate of one hundred (100) pounds per acre and shall be applied by the use of a “Cyclone Seed Sower” or equal.

7.3.02 Fertilizer. - The fertilizer shall be Ammonium Phosphate (16-20-0) spread at the rate of three hundred (300) pounds per acre and shall be applied by the use of a “Cyclone Seed Sower” or equal.

7.3.03 Mulch. - After the application of the seed and fertilizer, new straw (stable bedding straw shall not be used) shall be uniformly spread at the approximate rate of four (4) tons per acre. The straw shall then be “mulched” into the ground by the use of a “wire” roller or other approved equipment.

7.4 PROTECTION FOR STEEP SLOPES.

In cases where the grade over the pipeline exceeds twenty-five percent (25%) slope, the Contractor shall provide additional erosion-control measures to stabilize the backfill material. The Contractor shall submit to the District for its approval, special engineering details of the method to be used.

7.5 LATERALS & OFF-SITE SEWER INSTALLATIONS.

Off-Site (private) sewers may be handled as in Sections 7.1 through 7.4 Alternatively laterals and or Off-Site sewers exceeding twenty-five percent (25%) slope, or in areas judged by the District to require additional erosion protection will be handled as follows. Ref. Standard Drawing E-18.

7.5.01 Cut-Off Walls. - Cut-Off walls can be constructed of scrap lumber or masonry block. Cut-Off walls are to be installed in a transverse direction accoss trenches as they are backfilled. The walls must be flush with the finished grade and extend downward into the trench seven and one half (7 1/2) inches below the finished grade.

7.5.01 Jute. - Jute covering will be laid over all disturbed soil areas and pinned down with appropriate fasteners.

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SECTION 8
REMOVAL AND REPLACEMENT OF PAVED SURFACES

8.1 GENERAL.

Street pavement and surfaces shall be removed and replaced in all areas of construction excavation in conformance with details shown on the plans and as specified herein. Resurfacing of existing pavement and surfaces damaged or removed in connection with construction of improvements, including all appurtenances, shall conform to the provisions of permits issued by the State of California Department of Transportation, the County Transportation Department under whose jurisdiction the road falls, and/or the city for the work within the rights of way of these respective agencies.

8.2 EXCAVATION AND BACKFILL.

The Contractor is directed to Section 1, "Earthwork," of these specifications, for all items pertaining to excavation and backfilling.

8.3 PAVEMENT REMOVAL.

8.3.01 General. - Street pavement, existing road surfacing or other surfaced areas shall be removed within the limits of all construction excavations prior to proceeding with excavation operations of any nature. Surplus material shall be removed as provided in Section 1, "Earthwork," in these specifications. Prior to removal of existing surfacing, pavement cuts shall be made as shown on the plans and as specified herein. All pavement cuts shall be neat and straight along both sides of the trench, and approximately parallel to the alignment to the pipe, to provide an unfractured and level pavement joint for bonding existing surfacing with pavement replacement. Where large irregular surfaces are removed, such trimming or cutting as hereinafter provided shall be parallel with roadway centerline or at right angles to the same. All cut edges shall provide clean, solid, vertical faces, free from all loose material.

8.3.02 Plant-Mix Surfacing (Asphalt-Concrete Pavement). - Streets and alleys surfaced with asphalt-concrete pavement shall be cut at the limits of the trench and/or excavation prior to removal of existing surfacing. Cuts shall be made with pneumatic tools or other approved equipment.

8.3.03 Road-Mixed Surfacing. - Streets and alleys surfaced with road-mixed surfacing shall be cut at the limits of the trench and/or excavation prior to removal of existing surfacing. Cuts shall be made with pneumatic tools or other approved equipment.

8.4 REPLACEMENT.

8.4.01 General. - In all streets or areas in which the surface is removed, broken or damaged by equipment, or in which the ground has caved in or settled due to the installation of the improvements, the surface shall be restored to the original grade and crown section by the Contractor. In absence or specific designation on the plans, and where the street has been improved with roadway surface, base course, curb, sidewalk or gutter, trenches or damaged sections shall be restored with the type or improvement conforming to that which existed at the time the Contractor entered upon the work.

Prior to resurfacing, the existing surfacing shall be removed as provided above. All work shall match the appearance of the existing improvements and finished pavement shall not deviate from existing grade by more than one-eighth (1/8) inch in ten (10) feet and shall be free from ruts, depressions and irregularities.

8.4.02 State Highway Right of Way. - Construction of sewer lines within State Highway right of way shall be subject to Department of Transportation utility encroachment permit, which will be provided by the District. All work done within highway rights of way shall conform to the "Terms and Conditions Relating to Utility Encroachments," as issued by the State Department of Transportation, and as to details as indicated on the plans.

8.4.03 County Roads. The Contractor's attention is directed to the requirements of the County Transportation department regarding resurfacing of excavations in County roads. The specification, policies and procedures of said County Transportation Department shall supersede all other provisions of this Section within the jurisdiction of the County Transportation Department, but only if such specifications exceed the requirements of these specifications.

8.4.04 Base Material. - Base material shall be furnished, placed and compacted in the trench excavation when required by the agency having jurisdiction.

8.4.05 Plant-Mix Surfacing (Asphalt-Concrete Pavement). - All asphalt-concrete surfaces, including but not limited to pavements, curbs, driveways, and sidewalks, which are removed, damaged or broken by the Contractor's installation of improvement under this contract, shall be replaced and/or reconstructed. All asphalt-concrete shall be placed on compacted fills or base material as herein before specified, and replacement and/or reconstruction shall be to the same dimensions as existing surfaces unless otherwise stated herein or required by the agency having jurisdiction over the road.

Materials and workmanship for asphalt-concrete replacement and/or reconstruction shall conform to the requirements of Section 39 of the State of California Department of Transportation Standard Specifications.

Plant-mix surfacing shall be Type B asphalt-concrete and shall conform to the grading specified for one half (1/2) inch maximum, medium size, as specified in Section 39 of the above-mentioned specifications.

Paving asphalt to be mixed with the mineral aggregate shall be steam-refined asphalt and shall conform to the provisions in Section 92 in the above-named specifications, with the viscosity range of AR 1,000, 2,000 or 4,000 as specified by the Engineer.

Paint binder shall be grade RS-1 emulsified asphalt unless otherwise designated by the Engineer.

8.4.06 Road-Mix Surfacing. - All road-mix surfaces including but not limited to pavements, curbs, driveways, and sidewalks, which are removed, damaged or broken by the Contractor's installation of improvements under this contract, shall be replaced and/or reconstructed. All road-mix surfacing shall be placed on compacted fills or base material as herein before specified and replacement and/or reconstruction shall be to the same dimensions as existing surfaces unless otherwise stated herein or required by the agency having jurisdiction over the road.

Materials and workmanship for road-mix resurfacing and/or reconstruction shall conform to the requirements of Section 38 of the State Department of Transportation Standard Specifications.

Mineral aggregate may be either selected material from the roadway excavation of selected material obtained from other sources. All material shall first meet the approval of the agency involved and the Engineer.

Bituminous binder to be mixed with the mineral aggregate shall be a liquid asphalt, grade SC-800, and shall conform to the provisions in Section 93 in the above-named specifications. In no case shall the quantity of bituminous binder be less than five (5%) by weight of the dry mineral aggregate.

8.4.07 Temporary Resurfacing. - The Contractor shall furnish, place, and maintain temporary resurfacing as herein specified, over backfill in paved dedicated streets wherever so ordered in writing by the Engineer, or as specified by State, County or City permits.

Temporary resurfacing shall be placed at the locations and of the thickness required by the permit and/or by the Engineer and shall consist of a cold-mix asphalt concrete. Binder shall be liquid, grade SC-800 or approved equal.

Temporary resurfacing shall be placed to the grade of existing surfaces and rolled and compacted as soon as the condition of the backfill is considered, by the Engineer, to be suitable to receive such surfacing. The Contractor shall maintain all temporary resurfacing in proper, usable condition until the permanent resurfacing operations are to be commenced. Temporary resurfacing shall be removed and disposed of by the Contractor before permanent resurfacing is placed in conformance with the plans and specifications.

ATTACHMENT A – SUPPLEMENTARY SPECIAL PROVISIONS

Supplementary Special Provisions for Searles Valley Sewer Improvement.

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The following Supplementary Special Provisions (SSP) modifies the following documents:

i. County of San Bernardino Special Districts Department, Division "D" Technical Specifications Sewer (2012).

DIVISION D

TECHNICAL SPECIFICATIONS SEWER

SECTION 4

MANHOLES AND CLEANOUTS

POLYMER CONCRETE MANHOLES

To the County Standard Specifications, ADD the following:

POLYMER CONCRETE MANHOLES

To the County Standard Specifications, ADD the following:

SECTION 9 SUMMARY OF WORK

SECTION 10 MOBILIZATION

SECTION 11 TEMPORARY SEWER BYPASS

SECTION 12 DEWATERING

SECTION 13 GEOGRID

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POLYMER CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SCOPE

This specification covers polymer concrete structures (manholes, lift stations, non-cylindrical structures) intended for use in sanitary sewers, storm sewers, water lines and other applications where corrosion resistance is required.

1.02 REFERENCES

ASTM C 478 (most current) Standard Specification for Precast Reinforced Concrete Manhole Sections.

ASTM C 579 (most current) Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic, Surfacing, and Polymer Concretes

ASTM C 443 (most current) Standard Specification for Joints for Concrete Pipe and Manholes Using Rubber Gaskets

ASTM C 580 (most current) Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithihc Surfacings, and Polymer Concretes

ASTM C 857 (most current) Standard Practice for Minimum Structural Design Loading for Underground Utility Structures.

ACI 350-06 Code Requirements for Environmental Engineering Concrete Structures & Commentary

ACI 440.1R-15 Guide for the Design and Construction of Structural Concrete Reinforced with Fiber-Reinforced Polymer (FRP) Bars

ACI 548.6R-96 Polymer Concrete-Structural Applications State-of-the-Art Report

ASTM D 648 (most current) Test Method for Deflection Temperature of Plastics Under Flexural Load in Edgewise Position.

ASTM D 6783 (most current) Standard Specification for Polymer Concrete Pipe.

ASTM D 2584 (most current) Test Method for Ignition Loss of Cured Reinforced Resins.

ASTM C 923 (most current) Standard Specifications for Resilient Connectors between Concrete Manholes Structures and Pipe.

ASTM C 990 (most current) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections using Preformed Flexible Joint Sealants

ASTM C 497 (most current) Test Methods for Concrete Pipe, Manhole Sections, or Tile.

California Greenbook Standard Specifications for Public Works Construction Section 211-2

1.03 SUBMITTALS

A. Conform to bid document requirements

B. Submit manufacturer's data and details of following items for approval:

1. Shop drawings of structure sections, base units and construction details, jointing methods, materials, and dimensions

2. Summary of criteria used in design of structures including, at minimum, material properties, loading criteria, and dimensions assumed. Include certification from manufacturer that polymer concrete manhole design meets or exceeds the load and strength requirements of ASTM C 478 and ASTM C 857, reinforced in accordance with ACI 440.1R-15.

3. Frames, grates, vent pipes rings and covers, and other accessories as required by design

4. Materials to be used in fabricating pipe drop connections

5. Materials to be used for pipe connections

6. Materials to be used for stubs and stub plugs, if required

7. Proof of independent chemical resistance testing conducted in accordance with the standard specifications for public works construction (California Greenbook) Section 211-2

8. Current ISO 9001:2015 Certification for the facility where the polymer concrete structures are manufactured for the project.

9. References of 20 previous polymer concrete projects including scope in the last 5 years performed with both owner and contractor contact information for reference and review by owner. References of projects not being done by current company shall not be allowed.

10. 50 year corrosion warranty on the polymer concrete structures to be provided and enforced from contract completion date.

C. Submitted sealed drawings by a registered Professional Engineer in the state where installation is being performed

PART 2 PRODUCTS

2.01 POLYMER CONCRETE STRUCTURES

A. Provide polymer concrete manhole sections, monolithic base sections and related components referencing to ASTM C 478.

B. Provide base riser section with monolithic cast. Bench and invert channel and/or fillet shall be one continuous cast. No cold joints allowed.

   a. Foam inserts or any voids cast into a polymer concrete structure shall not be acceptable.
   b. For non-circular or large diameter structures with a “drop-in” channel or fillet split out for handling, the entire component shall be comprised of polymer concrete. Foam inserts or voids cast into these components shall not be acceptable.

C. Provide riser sections joined with bell and spigot / ship-lap design seamed with butyl mastic and or rubber gaskets (ASTM C 990) so that on assembly, structure base, riser and top section make a continuous and uniform structure.
   a. Grouted connections shall only be accepted as a secondary sealing method. Mastic and/or gaskets shall be required for each joint.

D. Construct riser components for polymer concrete structures from standard polymer concrete structure components of the diameter indicated on drawings. Use various lengths of polymer concrete structure components in combination to provide correct height with the fewest joints

E. Design wall sections for depth and loading conditions with wall thickness as designed by polymer concrete manufacturer.

F. Provide tops to support AASHTO HS-20 loading or loads as required and receiving cast iron frame covers or hatches, as indicated on the drawings.

2.01-1 DESIGN CRITERIA:

Polymer Concrete structure components (risers, cones, flat lids, grade rings and base sections) shall be designed by manufacturer to meet the intent of ASTM C 478 with allowable compositional and sizing differences as designed by the polymer concrete manufacturer.

1. AASHTO HS-20 design or as required loading applied to structure cover and transition and base slabs

2. Polymer manholes will be designed based upon live and dead load criteria in ASTM C 857 and ACI 350-06.

3. Unit soil weight of 120 pcf located above portions of manhole, including base slab projections.

4. Internal liquid pressure based on unit weight of 63 pcf.

5. Dead load of structure sections fully supported by polymer concrete structure base.

6. Buoyancy calculcations to be provided based on geotechnical report with a safety factor of at least 1.2.

2.01-2 DESIGN:

Polymer Concrete structure risers, cones, flat lids, grade rings and manhole base sections shall be designed by manufacturer to meet loading requirements of ASTM C 478, ASTM C 857 and ACI 350-06 as modified for polymer concrete structure design as follows:

1. Polymer Concrete Mix Design shall consist of thermosetting resin, sand, and aggregate. No Portland cement shall be allowed as part of the mix design matrix. All sand and aggregate shall be inert in an acidic environment.

2. Reinforcement – Shall use acid resistant reinforcement (FRP Bar) in accordance with ACI 440.1R-06 as applicable for polymer concrete design

3. The wall thickness of polymer concrete structures shall not be less than that prescribed by the manufacturer's design by less than 95% of stated design thickness

4. Each polymer concrete structure component shall be free of all defects, including indentations, cracks, foreign inclusions, foam voids or blockouts, and resin starved areas that, due to their nature and degree or extent, detrimentally affect the strength and serviceability of the component part. Cosmetic defect shall not be cause for rejection. The nominal internal diameter of structure components shall not vary more than 2%. Variations in height of two opposite sides of risers and cones shall not be more the 5/8 inch. The under run in height of a riser or cone shall not be more than ¼ in/ft of height with a maximum of ½ inch in any one section

5. Marking and Identification - Each structure shall be marked with the following information - Manufacturer's name or trademark, Manufacturer's location and Production Date.

6. Structurejoints shall be assembled with a bell/spigot or shiplap butyl mastic and/or gasketed joint so that on assembly, manhole base, riser and top section make a continuous and uniform manhole. External joint sealants can be utilized as well in areas of high groundwater or needing additional

containment. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity.

7. Minimum clearance between wall penetrations and joints shall be per manufacturer's design

8. Construct invert channels to provide smooth flow transition with minimal disruption of flow at pipe-manhole connections. Invert slope through manhole is as indicated on drawings. All precast base sections to be cast monolithically. Polymer concrete structure bench and channel are to be constructed with all polymer concrete material.

9. Extended ballast slab for buoyancy collars can be addressed with cementitious concrete material.

10. Provide resilient connectors conforming to requirements of ASTM C 923 or other options as avaliable. All connectors are to be water tight. Install approved resilient connectors at each pipe entering and exiting manholes in accordance with manufacturer's instructions.

2.01-3 QUALITY CONTROL

Facility Quality Control shall be maintained by adhearing to ISO 9001:2015 for manufacturing. All facility manufacturing polymer concrete shall be ISO 9001:2015 Certified, with current certification provided via submittals. All fabrication will take place in an all polymer concrete fabrication facility. At no time will the polymer concrete fabrication facility share the facility with a cementitious precast product production facility. Fabricator is also to provide references of 20 previous projects in the last 5 years performed with both owner and contractor contact information for reference and the scope and review by owner. References of projects not being done by current company shall not be allowed.

2.01-4 GROUTING

All materials needed for grouting and patching will be a polyester mortar compound provided by the manufacturer or an approved equal by the manufacturer.

2.01-5 MANUFACTURER

1. **Armorock Polymer Concrete www.armorock.com**
   702-824-9702

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SECTION 9

SUMMARY OF WORK

To the County's Standard Specifications, ADD the following:

PART 1 – GENERAL

9.1 WORK INCLUDED

The work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation and services, including fuel, power, water, and essential communications, and performing all work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the District.

9.2 RELATED WORK SPECIFIED ELSEWHERE (NOT USED)

9.3 WORK COVERED BY CONTRACT DOCUMENTS

The work generally includes, but is not limited to, furnishing all products, labor, equipment, material, transportation, and incidental services to construct the following:

1. Replace portions of the 12" sewer piping and manholes carrying effluent from the Pioneer Point and Trona Septic systems to Searles Lake, and all other work as indicated on the construction drawings and as specified herein and as necessary to complete the project in its entirety for a fully operational system to the satisfaction of the District.

9.4 PROJECT LOCATION

A. The Project is located in County Service Area 82 – Searles Valley. Refer to the project plans for specific location of the project work.

PART 2 – MEASUREMENT AND PAYMENT

9.1 GENERAL

The CONTRACTOR shall provide all labor, materials, equipment and incidentals for the work described within these specifications and construction drawings. Payment for each bid item shall be included in the contract unit price or lump sum price shown on the Bidder's proposal. Measurement for payment of lump sum items will be based on the component parts listed in the Bid Items, as required in this specification. Payment for component parts will be based on the Schedule of Values approved by the District. The cost breakdown shall include quantities and items aggregating the Bid Item in payments during construction. All measurements of quantities shall be approved by the District. Payment for each bid item shall include full compensation for all labor, materials, tools, and equipment necessary to complete the work as shown on the construction drawings and within these specifications and no additional compensation shall be allowed. This includes the cost of work not specifically listed in the Bid Schedule or Schedule of Values but, is necessary to complete the project as described and shown in the Contract Documents. Work for which no separate payment has been provided will be considered a subsidiary obligation of the Contractor, and the cost therefor shall be included in the applicable contract price for the item to which the work applies. All measurements of work done will be made by the District or its representative.

PART 3 – EXECUTION

9.1 WORK SEQUENCE

A. The general sequence of work shall be as follows:

1. Submit proposed schedule of work, insurance and bonds. Then Obtain required permits, licenses, and construction easements. After construction survey, call Underground Service Alert (DIGALERT) and utility owners to obtain mark out of buried utilities.
2. Contractor is responsible for obtaining construction water and meter from the Water District for any temporary water usage throughout duration of construction.
3. Secure laydown/staging areas. Contractor shall obtain approval for use of any public or private rights-of-way.
4. Take pre-construction photographs of the existing pipeline alignment and along proposed work areas.
5. Identify and pothole all points of connection and existing utilities crossing the pipeline alignment and those parallel to it within 5 feet, including the communication lines running parallel to the pipe alignment. Submit potholing results to the District for review, prior to starting any construction. Allow 10 working days for review.
6. Coordinate directly with Frontier Communications if it is determined from potholing that their communication lines conflict with the proposed project improvements.
7. Submit shop drawings and other submittals required by the plans or

Contract Documents.

8. Begin manufacturing and shipping materials and equipment after receiving approved submittals.
9. Complete work according to approved Proposed Work Schedule.
10. Finalize clean up and restore construction areas.

9.2 CONTRACTOR USE OF PROJECT SITE

A. The Contractor's use of the project site shall be limited to its construction operations. On-site storage of materials, on-site fabrication facilities, and field offices located within public right-of-way require approval from the District.

B. The Contractor shall install signs, barricades and lights necessary to ensure public safety and safety of District's operators and personnel. Provide plates across ditches to enable safe access of District's personnel to facilities or the public across excavations within public right-of-way that cannot be backfilled at the end of the day. Traffic control during hours of construction work shall be in accordance with the District approved traffic control plans included in this bid package.

9.3 DISTRICT USE OF PROJECT SITE

A. The District may utilize all or part of the existing facilities during the entire period of construction for the conduct of the District's normal operations. The Contractor shall cooperate and coordinate with the District to facilitate the District's operations and to minimize interference with the District's operations at the same time. In any event, the District shall be allowed access to the project site during the period of construction.

PART 4 – PAYMENT

GENERAL

The CONTRACTOR shall provide all labor, materials, equipment and incidentals for the work described within these specifications and construction drawings. Payment for each bid item shall be included in the contract unit price or lump sum price shown on the Bidder's proposal. Measurement for payment of lump sum items will be based on the component parts listed in the Bid Items, as required in this specification. Payment for component parts will be based on the Schedule of Values approved by the District. The cost breakdown shall include quantities and items aggregating the Bid Item in payments during construction. All measurements of quantities shall be approved by the District. Payment for each bid item shall include full compensation for all labor, materials, tools, and equipment necessary to complete the work as shown on the construction drawings and within these specifications and no additional compensation shall be allowed. This includes the cost of work not specifically listed in the Bid Schedule or Schedule of Values but, is necessary to complete the project as described and shown in the Contract Documents. Work for which no separate payment has been provided will be considered a subsidiary obligation of the Contractor, and the cost

therefor shall be included in the applicable contract price for the item to which the work applies. All measurements of work done will be made by the District or its representative.

9.1 MOBILIZATION

Payment for Mobilization will be made at the contract lump sum, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item shall include, but is not limited to, a pre-construction survey of the existing project site and staging area; development of a Staging and Storage Area Layout Plan; movement of personnel, equipment, supplies, and incidentals on and off the project site; the set up and removal of offices, temporary utilities, and other facilities from the project site, including transportation; and the cleanup and restoration of the project site, storage, and staging areas. All work shall be considered as compensated for in the lump sum price and no additional compensation shall be made thereafter.

9.2 SEWER BYPASS

Payment for Sewer Bypass will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for the sewer bypass. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the lump sum price and no additional compensation shall be made thereafter.

9.3 REMOVE AND REPLACE 12" SDR-26 PVC GRAVITY SEWER PIPE *WITH GEOGRID*

Payment for Remove and Replace 12" SDR-26 PVC Gravity Sewer Pipe *with Geogrid* – will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform removal and replacement of sewer pipe including dewatering pipe, accepting leak-by from isolation valves, over-excavation and disposal of unsuitable soils materials, *furnishing and installation of geogrid, furnishing and installation of suitable base materials,* and coordination with District to identify and close nearest downstream valve to facilitate the removal of the piping. All work shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter. Contractor investigation to verify size, material, thickness, and any other information required to perform work shall be considered as compensated for in the lump sum price and no additional compensation shall be made thereafter.

9.4 4-FOOT DIAMETER POLYMER CONCRETE SEWER MANHOLE

Payment for installation of 4-Foot Diameter Polymer Concrete Sewer Manholes will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for construction and installation of the 4-foot diameter polymer concrete sewer manholes*, including the cement slurry backfill and geogrid*. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.5 MANHOLE FRAME AND COVER

Payment for installation of Manhole Frame and Covers will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for construction and installation of the manhole frame and covers. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.6 CONCRETE STABILIZING RING AT GRADE

Payment for Concrete Stabilizing Rings at Grade will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for construction of concrete stabilizing rings at grade. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.7 CONCRETE STABILIZING RING FOR UNPAVED AREA

Payment for Concrete Stabilizing Rings for Unpaved Area will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for construction of concrete stabilizing rings for unpaved area. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be

considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.8 REMOVE AND DISPOSE MANHOLES

Payment for Remove and Dispose Manholes will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for the remove and dispose manholes. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.9 6-INCH ASPHALT CONCRETE PAVING

Payment for 6-Inch Asphalt Concrete Paving will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for the 6-inch asphalt concrete paving. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.10 6-INCH CRUSHED AGGREGATE BASE

Payment for 6-Inch Crushed Aggregate Base will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for the installation of 6-inch crushed aggregate base. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.11 CONCRETE ENCASEMENT

Payment for Concrete Encasement will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for the construction of concrete encasement. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described

in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.12 TRAFFIC CONTROL AND SIGNS

Payment for Traffic Control and Signs will be made at the contract lump sum, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for traffic control methods and signage. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the lump sum price and no additional compensation shall be made thereafter.

9.13 MANHOLE APRON

Payment for Manhole Apron will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for manhole apron. All work, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.14 DEWATERING

Payment for Dewatering will be made at the contract unit price, completed in accordance with the Contract Documents, and as directed by the District. Payment for this bid item will include furnishing all labor, materials, incidentals, and equipment to perform all work required for dewatering. All work (including permits, equipment, testing, filtration, standard filtration and pretreatment of possible pollutants), disposal of waste, power, sampling and testing groundwater and discharge for non-hazardous materials, settlement monitoring, reporting, furnishing all labor, materials, incidentals, and equipment to perform work as described in the contract documents shall be considered as compensated for in the unit price and no additional compensation shall be made thereafter.

9.15 PROJECT SIGN

The contractor shall fabricate, provide, and install two (2) 4ft. x 8 ft project signs of 0.063 thick aluminum with 2” C-channel frame bracing and anti-graffiti coating that is visible by the public and can withstand the weather conditions of the area. Location of project sign shall be coordinated with Special Districts (SDD) Project Manager. Sign material to be weatherproof, durable, and vandal resistant. SDD shall provide signage

design criteria to the Contractor and review and approve through Contractor's submittal. Project signs shall be maintained in good condition or replace if necessary during the course of construction.

9.16 SWPPP PREPARATION AND IMPLEMENTATION AND DUST CONTROL

Contractor shall prepare, implement, and maintain a job-specific SWPPP for their work. The compensation paid for SWPPP shall include, but not be limited to compensation for preparation of an approved SWPPP, maintaining the BMP's during the life of the construction, preparation of the Notice of Intent and filing with the State's SMART system, and preparation and filing of the Notice of Termination at the completion of the project.

At the time of the Preconstruction meeting, the Contractor shall have the SWPPP completed and signed by the Qualified SWPPP Developer (QSD), and it shall be reviewed for acceptance by the District prior to submittal to the Regional Board. The District LRP will appoint the Contractors QSD as the Data Entry Person (DEP) for uploading all SWPPP information to the State Water Boards "SMARTS" Web based system. The District reserves the right to require an approved SWPPP and the issuance of a Waste Discharge Identification Number (WDID) prior to issuance of the Notice to Proceed. The Contractor's Qualified SWPPP Practitioner (QSP) shall be responsible for implementing the SWPPP and conducting all required monitoring inspections and shall file original copies of the inspections and all other reports, certifications or records as required by the SWPPP with the Water Quality Control Board. All fines levied as a result of the Contractor's failure to comply with the requirements of the SWPPP shall be the Contractor's responsibility.

Time extensions will not be allowed for any suspension of work as a result of the Contractor's noncompliance with the SWPPP.

The compensation paid for SWPPP Preparation and Implementation shall include, but not be limited to compensation for coverage, development, preparation, filing of the Notice of Intent (NOI) and Notice of Termination (NOT), permit fees, and preparation/ implementation of a Storm Water Pollution Prevention Plan (SWPPP) under General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 2022-0057-DWQ. the contract lump sum bid price for "SWPPP Preparation and Implementation" and shall be full compensation for all costs incurred by the Contractor for performing all the work involved in carrying out the SWPPP with no additional compensation allowed.

County Public Works Department (DPW), Environmental Management Division has general oversight of all County SWPPP and MS-4 Permit compliance requirements

and may need to be consulted for assistance with providing SWPPP documents, inspections and compliance.

Contractor shall prepare, implement, and maintain a job-specific Dust Control Plan. The compensation paid for Dust Control shall include, but not be limited to compensation for maintaining dust control and air contaminates within the project area. Watering site as needed to control dust during project duration, street sweeping as needed to control dust and maintain clean public roadways, and application of chemical dust stabilizers shall be included in the contract lump sum bid price for Dust Control and Water Supply and shall be full compensation for all costs incurred by the Contractor for performing all the work involved in performing Dust Control and Clean Up measures.

9.17 TELEVISION INSPECTION

The contractor shall for viewing and recording on video, tape newly installed sewer pipeline and manholes. The total length of pipeline to be inspected by television shall be one hundred percent. The contractor shall provide a digital copy of the video log to the Special Districts Department (SDD).

END OF SECTION 9

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SECTION 10

MOBILIZATION

To the County Standard Specifications, ADD the following:

PART 1 – GENERAL

10.1 WORK INCLUDED

The work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation and services, including fuel, power, water, and essential communications, and performing all work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the District.

10.2 RELATED WORK SPECIFIED ELSEWHERE (NOT USED)

10.3 WORK COVERED BY CONTRACT DOCUMENTS

The work generally includes, but is not limited to, furnishing all products, labor, equipment, material, transportation, and incidental services to construct the following:

A. Replace portions of the 12” sewer piping carrying effluent from the Pioneer Point and Trona Septic systems to Searles Lake, and all other work as indicated on the construction drawings and as specified herein and as necessary to complete the project in its entirety for a fully operational system to the satisfaction of the District.

10.4 PROJECT LOCATION

A. The Project is located in County Service Area 82 – Searles Valley. Refer to the project plans for specific location of the project work.

PART 2 – MEASUREMENT AND PAYMENT

Not Used

PART 3 – EXECUTION

10.1 WORK SEQUENCE

A. The general sequence of work shall be as follows:

1. Submit proposed schedule of work, insurance and bonds. The Obtain required permits, licenses, and construction easements. After construction survey, call Underground Service Alert (DIGALERT) and utility owners to obtain mark out of buried utilities.
2. Contractor is responsible for obtaining construction water and meter from the for any temporary water usage throughout duration of construction.
3. Secure laydown/staging areas. Contractor shall obtain approval for use of any public or private rights-of-way.
4. Take pre-construction photographs of the existing facility.
5. Submit shop drawings and other submittals required by the plans or Contract Documents.
6. Begin manufacturing and shipping materials and equipment after receiving approved submittals.
7. Complete work according to approved Proposed Work Schedule.
8. Finalize clean up and restore construction areas.

10.2 CONTRACTOR USE OF PROJECT SITE

A. The Contractor's use of the project site shall be limited to its construction operations. On-site storage of materials, on-site fabrication facilities, and field offices located within public right-of-way require approval from the District.

B. The Contractor shall install signs, barricades and lights necessary to ensure public safety and safety of District's operators and personnel. Provide plates across ditches to enable safe access of District's personnel to facilities or the public across excavations within public right-of-way that cannot be backfilled at the end of the day. Traffic control during hours of construction work shall be in accordance with the District approved traffic control plans included in this bid package.

10.3 DISTRICT USE OF PROJECT SITE

A. The District may utilize all or part of the existing facilities during the entire period of construction for the conduct of the District's normal operations. The Contractor shall cooperate and coordinate with the District to facilitate the

District's operations and to minimize interference with the District's operations at the same time. In any event, the District shall be allowed access to the project site during the period of construction.

END OF SECTION 10

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SECTION 11

SEWER BYPASS PUMPING

PART 1 – GENERAL

11.1 WORK INCLUDED

A. All equipment and tools used for sewer bypassing shall be designed to prevent any and all sewage leaks or spills.

B. All equipment used as part of the bypassing system shall not cause a significant noise impact to the community in accordance with local noise ordinances. If noise complaints from residents occur due to the CONTRACTORS activities, the CONTRACTOR shall immediately replace the noise generating equipment or reduce the noise generated with mitigating devices to the satisfaction of the District.

C. Sewage shall be conveyed/pumped in closed conduits and disposed of in a sanitary sewer system. Sewage shall not be permitted to flow in trenches or be covered by backfill.

D. Suction and discharge manholes shall be sealed to prevent odors.

E. Access to driveways may not be blocked by the bypass pipe. Lay flat pipe, a raised platform above bypass pipe or a shallow trench may be used to provide access to residents.

F. If bypass piping must cross active streets, piping must be installed in a shallow trench. Lay flat piping or raised traffic platforms across these streets will not be allowed. Trench shall be backfilled or covered with recessed, secured trench plating.

G. All shallow trenching shall be backfilled and paved. All costs to install, maintain, backfill, and pave temporary shallow trenching shall be included in Contractor's bid item for sewer bypassing and no additional compensation shall be made therefor.

H. If deemed necessary due to lack of preparedness on the Contractor's part, the District has the option to clean up the sewage spill caused by the Contractor.

Clean up costs incurred by the District shall be recoverable in addition to the penalties from the Contractor's progress payments.

PART 2 – MATERIALS

11.1 PUMPING EQUIPMENT

A. All pumps used for sewer bypassing shall be the submersible type and shall only be operated below ground in the sewer manhole or other sewer facility. The use of above ground pumps or pumps not specifically designed for submersible service are not allowed.

B. The pumps shall be sized to fit in manholes or other confined areas necessary to successfully complete the sewer bypassing. The CONTRACTOR shall ensure all equipment used for bypassing will operate under the conditions required and the CONTRACTOR will be responsible for all costs associated with changes to the bypassing system due to inappropriate equipment or non-conformance with the Contract Documents.

C. The pumps shall be specifically intended for use with raw sewage and shall be capable of passing a 3-inch diameter solid.

D. Regardless of power used the total noise of any equipment used by the CONTRACTOR as part of the bypassing system shall be under 68 dba as measured standing thirty (30) feet from the equipment.

PART 3 – EXECUTION

11.1 GENERAL

A. The CONTRACTOR shall observe and comply with the District policy of "ZERO SPILLS".

B. The CONTRACTOR shall exercise care not to damage existing public and private improvements, interrupt existing services and/or facility operations which may cause a sewage spill. Any reasonably anticipated utility and/or improvement which is damaged by the CONTRACTOR shall be immediately repaired at the CONTRACTOR'S expense. In the event that the CONTRACTOR damages an existing utility or interrupts an existing service which causes a sewage spill, the CONTRACTOR shall immediately notify the

District representatives. The CONTRACTOR shall request and obtain from the District an emergency roster of the designated District representatives with their respective telephone numbers, pager numbers, and cellular phone numbers. The CONTRACTOR shall take all measures necessary to prevent further damage or service interruption, and to control, contain and clean up the resultant impacts of the damage, service interruption and any resulting sewage spill(s).

C. The CONTRACTOR shall continuously monitor the flow levels downstream and upstream of the construction location to detect any possible failure that may cause a sewage backup and spill. The CONTRACTOR shall include the means and methods of monitoring the flow in their Sewer Bypassing Plan.

11.2 SEWAGE SPILLS

A. In case of sewage spill, the CONTRACTOR shall act immediately, within fifteen minutes – without instructions from the District – to control the spill and take all appropriate steps to contain it in accordance with their Spill Response Plan.

B. The CONTRACTOR shall immediately notify the District representatives of the sewage spill(s) and all remedial actions taken.

C. The CONTRACTOR shall, within 24 hours from the occurrence of the spill, submit to the District a draft written report describing the following information related to the spill: the location on a current Thomas Bros. guide map; the nature and volume; the date and time; the duration; the cause; the type of remedial and/or preventive actions taken; and the water body impacted and results of any necessary monitoring. The District will review the draft report, and if revisions are required, the CONTRACTOR shall make those revisions and submit the final report to the District within 24 hours of the receipt of comments. Requests for additional compensation for the handling of the spill shall be submitted to the Engineer as a construction claim. The CONTRACTOR shall assure the validity, accuracy, and correctness of the claim under penalty of perjury. The Engineer may institute further corrective actions, as deemed necessary, to fully comply with existing law, ordinance, code, order or regulation. The CONTRACTOR shall be responsible for all costs incurred for the corrective actions.

D. It shall be the CONTRACTOR's responsibility to assure that all field forces, including Subcontractors, know and obey all safety and emergency

procedures, including the Spill Response Plan, to be maintained and followed at the Site.

11.3 SEWER BYPASSING

A. The CONTRACTOR shall provide temporary means to maintain and handle the sewage flow in the existing system as required to complete the necessary construction.

B. The CONTRACTOR shall size the bypass system to handle the peak flow of the system. The CONTRACTOR shall provide a redundant, identically sized, one hundred percent (100%) backup bypass system. The CONTRACTOR shall utilize the backup system to mitigate any additional wet weather flows, perform the necessary maintenance and repairs on the primary bypass system, and exercise and ensure the operability of the backup system. Each pump, including the backup pumps, shall be a complete unit with its own suction and discharge piping. The CONTRACTOR shall operate the backup bypass system for a minimum of twenty-five percent (25%) of the time on a weekly basis. The backup bypass system shall be fully installed and operationally ready at all times.

C. Prior to the full operation of the bypass system, the CONTRACTOR shall demonstrate, to the satisfaction of the DISTRICT, that both the primary and backup bypass systems are fully functional and adequate, and shall certify the same, in writing, in a manner acceptable to the DISTRICT.

D. The CONTRACTOR shall provide all equipment necessary to minimize the noise generated by the bypassing operations. Noise levels from the complete bypassing system shall not exceed the levels allowable under the local jurisdictional codes and requirements.

E. The CONTRACTOR shall continuously (while in use) monitor the operation of the bypass system and all impacted facilities. The CONTRACTOR shall submit, as part of their bypass plan, their system monitoring procedure and frequency. The CONTRACTOR shall maintain a log of the monitoring in a manner acceptable to the Engineer.

F. The CONTRACTOR shall continuously monitor the flow levels downstream and upstream of the bypass to detect any possible failure that may cause a sewage backup and/or spill. The CONTRACTOR shall include the means and methods of monitoring the flow in their Bypassing Plan. The CONTRACTOR

shall provide flow monitoring data to the District on a weekly basis in a format acceptable to the District.

G. The CONTRACTOR shall routinely inspect and maintain the bypass system, including the backup system. The CONTRACTOR shall submit as part of their Bypassing Plan their maintenance procedures and frequency. The CONTRACTOR shall maintain a log of all pertinent inspection, maintenance and repair records in a manner acceptable to the Engineer.

H. At the end of each day's work, the CONTRACTOR shall re-establish sewer flows in the gravity sewer system. Work undertaken each day shall only include work that can be completed during that working day.

PART 4 – MEASUREMENT AND PAYMENT

NOT USED

END OF SECTION 11

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SECTION 12

DEWATERING

PART 1 – GENERAL

12.1 WORK INCLUDED

A. The CONTRACTOR shall perform site dewatering necessary to lower and control groundwater levels and hydrostatic pressures to allow excavation and construction to be performed properly under dry conditions. This Section includes materials, installation, maintenance, operation, and removal of temporary dewatering systems.

B. The CONTRACTOR shall perform all treatment necessary for the legal disposal of all groundwater encountered. The cost of treatment shall be borne by the CONTRACTOR and no additional compensation will be made for inadequate treatment facilities.

C. Dewatering operations shall be adequate to ensure the integrity of the finished project. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

12.2 CONTRACTOR SUBMITTALS

A. The following shall be submitted in compliance with San Bernardino County's standard provisions:

1. Before starting excavation, the CONTRACTOR shall submit Shop Drawings including a detailed plan, schedule, and description of the dewatering of excavations. The Shop Drawings shall include: the proposed type of dewatering system; the arrangement, location, and depths of system components; a complete description of the equipment and instrumentation to be used, with installation, operation and maintenance procedures; a description of the CONTRACTOR'S means and methods for measuring groundwater levels and piezometric water levels; and the methods for disposal of dewatering effluent.

2. Before starting excavation, the CONTRACTOR shall submit copies of well installation permits, if required.

3. Before starting excavation, the CONTRACTOR shall obtain and submit copies of a National Pollutant Discharge Elimination System (NPDES) Permit from the Regional Water Quality Control Board (RWQCB).

4. The CONTRACTOR shall submit copies of well destruction permits, if applicable.

5. The CONTRACTOR shall be solely responsible for obtaining groundwater discharge permits. The CONTRACTOR must submit copies of these permits to the DISTRICT.

B. CONTRACTOR shall submit a daily report that includes the following information:

1. Groundwater levels and piezometric water levels in observation wells (if any).

2. Changes in elevation of reference points as stated in Subparagraph 1.5.C below to detect settlement in adjacent structures.

3. The average dewatering flow rate.

4. Water quality testing results as required by the Regional Water Quality Control Board.

12.3 QUALITY ASSURANCE

A. The CONTRACTOR shall conduct a demonstration of its proposed system and shall provide verification that adequate personnel, materials, and equipment are available.

B. The CONTRACTOR shall maintain adequate control to ensure that the stability of excavated and constructed slopes is not adversely affected by water, that erosion is controlled, and that flooding of excavations or damage to structures does not occur.

C. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, the CONTRACTOR shall establish reference points and shall observe the reference points at frequent intervals to detect any settlement which may occur. Frequency of intervals of detection testing shall be determined based on recommendations of the soils engineer and the nature of the critical structure or facility and distance from the excavation, except that the minimum frequency shall be twice per working day (once at the beginning of the workday and once at the conclusion of the workday).

12.4 DEWATERING EXPECTATIONS

A. The CONTRACTOR shall assume that groundwater may be present in all excavations throughout the length of the project. The CONTRACTOR shall be prepared for dewatering activities and shall treat and legally dispose of the groundwater in compliance with all Federal, State, and Local regulations and the requirements of the permits relating to groundwater discharge.

PART 2 – MATERIALS

12.1 MATERIALS AND EQUIPMENT

A. Dewatering, where indicated, includes well points, sump pumps, treatment facilities, temporary pipelines for water disposal, rock or gravel placement, observation wells, and other means including standby pumping equipment maintained on the jobsite continuously.

B. The CONTRACTOR shall provide piezometers for monitoring groundwater levels or other instruments and measuring devices, as required.

PART 3 – EXECUTION

12.1 GENERAL REQUIREMENTS

12.2

A. The CONTRACTOR is responsible for compliance with Regional Water Quality Control Board or DISTRICT requirements for any discharge of groundwater to the environment. The CONTRACTOR shall comply with Regional Water Quality Control Board Waste Discharge requirements. Before starting dewatering operations, the CONTRACTOR shall obtain the required permits and authorization, as required, for the disposal of groundwater. The CONTRACTOR shall comply with all applicable sampling, testing, monitoring, and reporting requirements.

B. The CONTRACTOR shall maintain an adequate system to lower and control the groundwater to permit excavation, construction of structures, and placement of fill materials to be performed under dry conditions.

C. Sufficient dewatering equipment shall be installed to pre-drain the water-bearing strata below the bottom of foundations, drains, water lines, sewer lines, and all other excavations.

D. The hydrostatic head in water-bearing strata below pipelines, appurtenances, foundations, and all other excavations shall be reduced to ensure that the water level is a minimum of two (2) feet below the excavation surface at all times.

E. The system shall be placed into operation before excavation below groundwater level is started. The system shall be operated continuously 24 hours a day, 7 days a week until pipelines, appurtenances, and structures have been constructed, fill materials have been placed, and dewatering is no longer required.

F. The site shall be graded to facilitate drainage and runoff shall be diverted from the excavation. Surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped or drained by gravity away from the excavation.

G. Dewatering shall at all times be conducted to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

H. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with drain rock at no additional cost to the DISTRICT.

I. Flotation of structures and facilities shall be prevented by maintaining a positive and continuous removal of water.

J. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand packed and/or other means shall be used to prevent pumping of fine sands or silts from the subsurface. A continuous check shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

K. Water and debris shall be disposed of in a legal and suitable manner in compliance with permit requirements and SSPWC Subsection 306-5, without damage to adjacent property. No water shall be drained into work built or under construction. Before disposal, water shall be treated in accordance with permit requirements. Before disposal, water shall be filtered to remove sand and fine-sized soil particles.

L. The release of groundwater to its original level shall be performed in a manner that avoids disturbance of natural foundation soils, prevents disturbance of compacted backfill, and prevents flotation or movement of structures.

END OF SECTION 12

SECTION 13

MULTI-AXIAL GEOGRID FOR SUBGRADE REINFORCEMENT

To the County Standard Specifications, ADD the following:

13.1 General

This work shall consist of furnishing and placing a multi-axial geogrid in pipe trench below bedding as shown on the Plans or directed by the Engineer.

13.2 Material

A. The geogrid material shall be Tensar Tri-Ax TX-190L as manufactured by Tensar International Corporation, or approved equal, conforming to the physical properties for Type R3 Multi-Axial Geogrid in the following table from the 2021 Greenbook ("TABLE 213-5.2 (E): MULTI-AXIAL") and meeting the full requirements of Paragraphs B and C of this section:

		Type [1]		
Property	**Test Reference**	**R1**	**R2**	**R3**
Aperture Shape	Observation	Triangular	Triangular	Triangular
Percent Open Area (%) Min.[2]	CW-02215	80	79	78
Secant Modulus @ 0.5% strain, lbs./ft., Min. [3]	ASTM D6637	10,285	15,430	20,580
Secant Modulus Ratio, dimensionless[4]	ASTM D6637	>0.60	>0.60	>0.60
Junction Strength Efficiency (%)[5]	ASTM D6637 ASTM D7737	93	93	93
Ultraviolet Stability, @ 500 hrs. (%)	ASTM D4355	70	70	70

1. *Tabulated values are based on multi-axial geogrids containing more than four intersecting ribs at each junction formed into a radially stable network of open equilateral triangle apertures. Values for other shapes shall be as specified in the Special Provisions.*
2. *Minimum determined in accordance with modified Corps of Engineers CW-02215*
3. *Minimum value of secant modulus is measured in both the rib direction and mid-rib direction (direction that bisects the angles between ribs). Secant modulus measured in the rib direction is determined in accordance with ASTM D6637 Method B. Secant modulus measured in the mid-rib direction is determined with ASTM D6637 modified Method B. Mid-rib force per unit width, in kN/M, is calculated as the observed force, in KN, minus the slack tensile load, in kN, divided by a nominal width of the specimen (minimum of 0.20 meters). Mid-rib secant modulus at 0.5% strain is calculated as the mid-rib force per unit width times 100 divided by 0.5. The minimum number of tests shall be determined as the number of observed symmetric axes, starting at 0 degrees, and include a mid-rib and 90-degree direction test. The direction of testing for all multi-rib specimens shall be reported in accordance with Figure 1 of ASTM D6637.*
4. *Ratio of the minimum to maximum MARV values of secant modulus at 0.5% strain*
5. *Junction strength efficiency is the average junction strength, in N, in accordance with ASTM D7737 Method A divided by the single rib strength, in N, in accordance with ASTM D6637 Method A and expressed as a percentage. The direction of testing for all multi-rib specimens shall be in the rib direction and reported in accordance with Figure 1 of ASTM D7737*

Any submittal for an alternate geogrid material, not meeting the requirement of Part A, must be submitted at least 2 weeks in advance of the bid date.

13.3 Submittals

A. Submit geogrid product sample approximately 1 foot x 1 foot.

B. Submit the manufacturer's certificate of compliance and certified test results on the product, tested within six months of the submittal date. Sampling shall be in accordance with ASTM D4354. Additionally, the following shall be included in the submittal:

1. *Manufacturer's name, current address, and telephone number.*
2. *Manufacturer's current Quality Assurance / Quality Control Manual.*
3. *Full product name by trademark and product number.*
4. *Geogrid polymer type(s).*
5. *Installation instructions.*
6. *Geogrid product data sheet.*

13.4 Storage and Handling

A. Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.

B. Store at temperatures above minus 20 degrees F (minus 29 degrees C).

C. Rolled materials may be laid flat or stood on end.

D. Geogrid materials should not be left directly exposed to sunlight for a period longer than the period recommended by the manufacturer

13.5 Placement

A. The subgrade soil shall be prepared as indicated on the construction drawings or as directed by the Engineer.

B. The geogrid shall be placed at the proper elevation and alignment as shown on the construction drawings.

C. The geogrid shall be installed longitudinally along the pipeline alignment in accordance with the Plans, specifications and any installation guidelines provided by the manufacturer, or as directed by the Engineer,

D. The geogrid may be temporarily secured in place with plastic zip ties, staples, aggregate base or fill backfill as required by fill properties.

E. Adjacent rolls of geogrid shall be overlapped a minimum of 1 foot. Softer subgrade conditions may require up to 3 feet of overlap.

F. Granular fill material shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in the geogrid and/or movement of the geogrid.

G. Any damaged or defective geogrid (i.e., frayed coating, separated junctions, separated layers, tears, etc.) will be replaced. Any roll of geogrid damaged before, during and after installation shall be replaced by the Contractor at no additional cost to the Owner. Proper replacement shall consist of replacing the affected area.

13.6 Quality Control

A. Pre-Construction Conference: Prior to the installation of the geogrid, the Contractor shall arrange a meeting at the site with the manufacturer representative and, where applicable, the geogrid installer. The engineer shall be notified at least 3 days in advance of the time of the meeting.

13.7 Measurement and Payment

Not Used

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ATTACHMENT B – SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT PERMIT

San Bernardino County Flood Control District (SBCFCD) Permit No. FCCON-2023-00091 for Construction within SBCFCD Right of Way

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Inspection office shall be notified two working days prior to commencing permitted use. FAILURE TO OBTAIN INSPECTION SHALL BE CAUSE FOR REVOCATION OF THIS PERMIT.

San Bernardino County Flood Control District
825 East Third Street, Room 108
San Bernardino, CA 92415-0835
(909) 387-7995 - FAX (909) 387-1858

PERMIT

Permit Issued: **Permit Expires:** **File:** 6-803/2.04
Permit No: FCCON-2023-00091

Permittee: San Bernardino County
Special Districts Department
222 W. Hospitality Land, 2nd Floor
San Bernardino, CA 92415

Contact/Phone: Alfonso Fausto 909-771-1702
Project Manager

Permit Activity: Install, operate, and maintain: 1) a 12-inch PVC sewer line crossing the District's facility via trench, and 2) remove and replace manhole and cover

Facility: Trona Flood Channel
Location: Trona Road
City/Community: Unincorporated area of San Bernardino County

1. This Permit is not valid without the accompanying Special, Standard, and General Provisions and any additional exhibits referenced by those provisions. Exercise of this Permit, the performance of any work contemplated hereunder, by Permittee or Permittee's authorized agent, shall indicate acceptance of and agreement to comply with all of the provisions of this Permit. Permittee shall make all contractors doing work on the Project familiar with all of the requirements of this Permit. Violation of any provision of this Permit shall be cause for immediate revocation of this Permit.
2. This Permit, or a certified copy thereof, shall be kept at the job site throughout the period of operations within District right-of-way and shall be shown to any District Representative or any law enforcement officer upon demand.
3. No revisions to the approved plans shall be made during installation without review, written approval and/or Permit Amendment from the District.

PERMITTEE'S ACCEPTANCE:

Signature by the Permittee, or Permittee's Authorized Agent, of this Permit shall indicate acceptance of all of the provisions of the Permit and shall represent that signee has full authority to act on behalf of and legally bind Permittee to all terms herein.

Permittee's Signature Date

PRINT

EMAIL

cc: CA Dept. of Fish and Wildlife
FC Operations Supt
Inspector

DISTRICT APPROVAL:

BRENDON BIGGS, M.S., P.E. Date
Chief Flood Control Engineer

SPECIAL PROVISIONS

1. It shall remain the responsibility of the Permittee to operate and maintain the improvements in perpetuity once installation activities have been completed. The Permittee shall notify the District in advance as well as show any necessary approvals prior to performing maintenance activities on such improvements within District right-of-way.

STANDARD PROVISIONS

1. This Permit shall become effective upon the "Permit Issued" date shown on Page 1 of this Permit. All Permit provisions and all applicable fees (i.e. review fees, inspection fees, monthly land use fees, etc.) for the Permit shall commence or become enforceable upon the Permit Issued date, regardless of the Permittee's actual commencement of activity within District right-of-way. Signature by the Permittee or Permittee's Authorized Agent on Page 1 of this Permit shall indicate the Permittee's agreement to assume all responsibility and to adhere to the Permit terms and fees from the date of Permit issuance.

2. Issuance of this Permit specifically prohibits any tracked or wheeled equipment entering or conducting work within the bed, or inner bank of Trona Flood Channel. All construction activities must avoid impacts to Waters of the United States, Waters of the State, and California Department of Fish and Wildlife regulated resources. Any violation of County, State, or federal environmental regulations may result in significant fines and/or mandatory work stoppage/delays.

3. The underground sewer line shall be adequately marked with above ground markers per the District's Standard Plan 204 at intervals to be determined in the field by the District.

GENERAL PROVISIONS

1. It shall be the responsibility of the Permittee to adhere to all applicable Federal, State and local laws and regulatory requirements. The Permittee shall comply with the District's Stormwater Ordinance 3588 and all applicable National Pollutant Discharge Elimination System (NPDES) requirements to reduce or eliminate pollution of stormwater discharges into waters of the United States. In this regard, the Permittee shall utilize Best Management Practices (BMPs) in the construction and subsequent operation of the permitted activity to prevent any pollutants (including sediment) from being discharged into any storm drain and/or channel systems.

   The following items must also be adhered to:

   - Appropriate BMPs should be utilized during all phases of work.
   - All pollutant impacts from spills, drips, overspray, and/or other accidental releases to soil shall be mitigated in a timely manner. Mitigation typically includes disposal of impacted soils through appropriate hazardous waste procedures.
   - Upon the completion of the project or portion of the project covered under this Flood Control Permit, all trash and/or debris shall be removed. No waste shall be disposed of in any District facility.
   - Permittee shall, at all times, exercise proper dust control and dust abatement.

2. The use of any District-owned property, easement areas, or areas covered under any agreement involving the District for conservation or mitigation purposes by any entity other that the District is expressly prohibited under this Permit, unless such conservation or mitigation has been specifically listed as an authorized Permit activity on Page 1 of this Permit. This prohibition shall remain in

perpetuity regardless of approvals that the Permittee or Permittee's authorized agent may obtain within environmental permits or documents from any and all environmental regulatory agencies prior to issuance of the District's Permit.

3. The review and inspection fees for this Permit shall be based on the District's Schedule of Fees Ordinance in effect at the time of District review and/or inspection. Upon completion of the permitted activity, the District will compile all District costs as outlined on the appropriate Schedule of Fees. In the event costs exceed the deposit amount, the Permittee will be billed for the overage and hereby agrees to pay such amount to the District. In the event costs are less than deposit amount, the excess will be refunded to the Permittee.

4. The District's Schedule of Fees Ordinance is subject to change by the District Board of Supervisors. The Board typically considers changes in the Schedule of Fees Ordinance to take effect at the beginning of each fiscal year (July 1). Should the borrow fee rate be adjusted at any time during the life of this Permit in accordance with changes to the Schedule of Fees Ordinance, the Permittee shall have the right to continue soil removal based on the new rate or request cancellation of its Permit prior to the effective date of the new rate. Upon cancellation, the Permittee shall be responsible for restoring the work area to the satisfaction of the District prior to vacating District right-of-way. The District shall not be responsible for any impact to contractual obligations the Permittee may have as a result of revisions to the District's Schedule of Fees Ordinance.

5. **The term of installation/construction shall be completed prior to the Permit expiration date.** The District will coordinate an extension(s) to the Permit term upon receipt of a completed Flood Control Permit Amendment Application at least thirty days prior to the expiration date.

6. This Permit is valid only to the extent of the District's jurisdiction. Permits or other approvals required by other agencies or underlying fee owners of District easement lands shall be the responsibility of the Permittee. Nothing contained in this Permit shall be construed as a relinquishment of any rights now held by the District.

7. Should any survey monumentation be located during Permit activity construction, and it is further determined that such monumentation will be disturbed or destroyed during construction, then a Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying shall submit a corner record showing pre-construction ties prior to disturbing the monument with the County Surveyor prior to the start of construction. The monuments shall be reset in a surface of the new construction, with a suitable monument box placed thereon, or set with permanent witness monuments. A corner record shall be filed with the County Surveyor for reset of monuments and evidence submitted prior to finalizing the Permit. All work shall be performed under the direction of a licensed land surveyor or registered civil engineer at the expense of the Permittee.

8. Permittee shall make all contractors doing work on the Improvements and/or within the District right-of-way familiar with all of the requirements of this Permit.

9. The Permittee shall be responsible to provide inspection and/or video inspection and all associated reports, etc. for the life of the structures allowed under this Permit within 90-days after written notification by the District. All reports and documentation shall be to standards acceptable to the agencies requesting the inspection (e.g. State or Federal agencies).

10. No floatable materials or stockpiling shall be maintained in District right-of-way, and equipment shall be kept out of District right-of-way except when in use during work hours.

11. The existing access gates shall be locked after hours and on weekends by interlocking Permittee's lock with the District's lock to allow District access. The Permittee shall ensure that the gate remains locked at all times except when authorized access is required.

12. The proposed activity within District right-of-way shall be in compliance with all applicable City/County ordinances for noise and operating hours.

13. The Permittee shall not have exclusive use of the District right-of-way. The District may allow other Permittees access to the area to engage in permitted activities.

14. All existing asphalt or concrete surfacing removed within District right-of-way shall be sawcut at the removal limits. Any settlement in the future shall be maintained by the Permittee.

15. All loads and vehicles accessing the Permit site shall comply with applicable State Motor Vehicle requirements.

16. Backfill in all areas having flood control facilities shall be similar to the existing material and shall not contain organic material, broken concrete or pavement, or other material unsuitable for compaction. Backfill two feet deep under concreted rock slope protection and/or two feet behind concrete structures shall be compacted to at least 95% of maximum dry density as determined by ASTM Test Method D-1557. All other backfill shall be compacted to at least 90% relative density as determined by ASTM Test Method D-1557, Method C and certified evidence thereof submitted. Compaction tests shall be performed at locations specified and to the satisfaction of the District.

17. All construction and material testing for facilities constructed within District right-of-way will be performed by the Permittee and/or Permittee's authorized agent and certified evidence thereof shall be furnished to the District at the Permittee's expense.

18. If required by the District's Inspector, the Permittee shall, at the time of the final inspection, submit "Record Drawings" that are sealed/stamped, signed, and dated by a California Registered Professional Engineer in responsible charge of the designs shown on the Plans. In addition, an electronic "PDF" format copy will be required.

19. No more than one-third (1/3) of any flood control facility may be obstructed during the period October 15 to April 15, nor more than two-thirds (2/3) of any facility may be obstructed during the remaining period. The term "obstruction" shall include all temporary or permanent structures, falsework, excavated material, and equipment connected with the construction. For the purpose of computing the area of an obstruction, dimensions shall be taken normal to the channel flow of the actual physical outline of the obstruction.

20. The Permit can be immediately revoked at any time, effective upon written notification from the District. Violation of any provisions of this Permit shall be cause for immediate revocation of this Permit. Upon revocation, the Permittee shall cease all activities and restore District right-of-way to the satisfaction of the District.

21. At any time during the life of this Permit, the District may revise, modify, or add provisions to this Permit as may be required to meet the flood control, water conservation, and safety responsibilities of the District.

22. Should maintenance of the Improvements be required at any time, the Permittee shall coordinate such maintenance activity with the District's Flood Control Operation's Support Division.

23. INSURANCE - This Permit shall not become valid until the Certificate of Insurance has been completed by Permittee's contractor's insurance company and approved by the Flood Control District. If the Permit activity is to be completed by Permittee's forces, the Certificate of Insurance shall be completed by Permittee's insurance company and approved by the Flood Control District.

24. The Permittee shall indemnify, defend, and hold the District, the County of San Bernardino, their Boards of Supervisors, and all of their officers, employees and agents free and harmless from any and every claim, demand or action for damages, or injury to any person or persons or property of any kind whatsoever, which may arise out of or result from this Permit, Permittee's construction, operation, use or activities on the District right-of-way and/or the Improvements. If the Permittee fails to comply with any obligation contained herein, Permittee shall be liable to the District for any administrative expenses and attorney's fees incurred in obtaining compliance with this Permit and any such expenses and fees incurred in processing any action for damages or for any other remedies permitted by law.

25. The Permittee shall be responsible for obtaining and adhering to all required permits and permit conditions prior to the start of any activity authorized by this Permit. A copy of all completed and executed regulatory permits, i.e. California Department of Fish and Wildlife 1600, Water Board 401, and/or US Corps of Engineers 404, shall be submitted to the District prior to start of work. When applicable, a copy of all fully executed regulatory permits shall be kept at the project site at all times while all project activities take place. The Permittee shall be responsible for all contractors working on this project and their understanding of all the permits and their conditions, both encroachment and regulatory, requirements, minimization measures, best management practices, mitigation measures, etc.

26. Prior to beginning any activity authorized in this Permit, the Permittee and/or Permittee's authorized agent, shall notify Underground Service Alert (USA) at 1-800-422-4133 at least 48 hours in advance to coordinate the Permit activity on District right-of-way.

27. In accepting this Permit, the Permittee agrees to replace any existing improvements which may include but not be limited to access road pavement, irrigation pipelines, chain link fencing and landscaping with acceptable products, installed to size, line and grade as the existing products removed and as approved by the District.

28. Work done in the absence of prescribed inspection may be required to be removed and replaced under the proper inspection, the entire cost of removal and replacement, including the cost of all materials used in the work thus removed, shall be borne by the Permittee, regardless of whether the work removed is found to be defective or not. Work covered up without the authority of the District, shall upon order of the District, be uncovered to the extent required, and the Permittee shall bear the entire cost of performing all the work and furnishing all the equipment and materials necessary for the removal and subsequent replacement of the covering, as directed by the District.

29. Should installation or maintenance activities be required during the period October 15 to April 15, work shall be undertaken within a 5-day clear weather forecast. Permittee shall maintain and provide for a flood watch when storm conditions threaten, and have personnel and equipment available on a 24-hour schedule and provide the District with the names and after-hours phone numbers of responsible supervisory personnel.

30. Access to the District's levees, channels and patrol roads shall remain open and free to vehicular traffic at all times. Alternate access to the facilities shall be provided when existing access is severed or impaired. Permittee must prevent the public or unauthorized persons from entering the construction area or the District's right-of-way.

31. The Permittee shall perform, at Permittee's own expense, all construction surveying and engineering necessary to control construction to limits defined in the plans and exhibits. The construction surveying and engineering will be performed to the District's satisfaction.

32. The location of any temporary construction roadways or ramps which the Permittee may wish to build within District right-of-way shall be subject to the approval of the District. Roads shall be constructed so as to wash out during any appreciable flows.

33. If the Permittee should refuse or neglect to comply with the provisions of the Permit, or the orders of the District, the District may have such provisions or orders carried out by others at the expense of the Permittee.

34. No part of the activities authorized under this Permit shall be accepted in phases. All work within District right-of-way must be completed prior to District acceptance of improvements within District right-of-way.

35. At the completion of the construction activities, the area shall be cleaned, graded and dressed to the satisfaction of the District. A joint inspection (Permittee/District) shall be made to determine if the work has been completed in accordance with Permit requirements.

36. Activities under this Permit are subject to any instructions of the Chief Flood Control Engineer or his /her representative. ALL INSTRUCTIONS MUST BE STRICTLY OBSERVED.

37. District activities shall take precedence at all times and, when any work or activity must be performed to carry out the functions and purposes of the District, Permittee must allow same to be done without interference.

38. Any damage caused to District facilities or structures by reason of the exercise of the Permit shall be repaired at the cost of the Permittee to the satisfaction of the District. Permittee will be billed for the actual cost to the District should Permittee neglect to make such repairs promptly.

39. Any District right-of-way monuments that are removed, disturbed, or destroyed as a result of activity under Permit will be replaced by the District. Permittee will be billed and agrees to immediately pay all costs of such replacement.

40. Unless otherwise specified herein, this Permit is subject to all prior permits, agreements, easements, privileges or other rights, whether recorded or unrecorded, in the area specified in this Permit. Permittee shall make his own arrangements with holders of such prior rights.

41. The Improvements shall be maintained, repaired, and operated in accordance with:

- The San Bernardino County Department of Public Works, Transportation and Flood Control Standard Specifications, available at the Department of Public Works, 825 E. Third Street, San Bernardino, California; and

- All applicable provisions of the "Construction and Safety Orders" issued by the State Division of Industrial Safety and "Manual of Accident Prevention in Construction" issued by the Associated General Contractors, Inc.

42. All work associated with the activities authorized under this Permit shall conform with all Cal-OSHA requirements. Prior to any shoring activity, the Permittee or Permittee's authorized agent shall submit shoring plans, signed and approved by a registered engineer, and copies of required permits.

43. It shall be the responsibility of the Permittee and/or the Permittee's authorized agent to insure that all personnel performing work authorized under this Permit are adequately trained and have appropriate safety gear and equipment before entering any confined space.

44. The area disturbed by permitted activities shall be kept to minimum and shall be limited to that area actually being worked.

45. No nuisance shall be allowed on any of the premises and the Permittee shall exercise diligence in precluding any dumping operations in the area by patrolling or installing barriers to deter unauthorized access when the premises are not supervised.

46. Any unauthorized structure or portions thereof placed on District right-of-way or which affect District structures, must be removed by Permittee without cost to the District.

47. It is expressly understood that the area involved under this Permit is subject to inundation from storm, flood, and/or conservation flows at any time, and that the District shall not, in any way, be obligated to afford protection against said flows, or to assume any cost for damages. The District reserves the right to divert any storm or flood flows upon any land under this Permit at any time and without notice, and no diversion of such shall be made by the Permittee without the consent of the District.

48. All concrete shall conform to Section 201-1 of the Standard Specification for Public Works Construction, latest edition, unless otherwise specified in this Permit. Curing compound shall conform to the provisions of Section 201-4.1 of the Standard Specifications for Public Works Construction, latest edition.

49. The Permit activities allowed under this Permit may require the Permittee to use a pre-emergent within District right-of-way in order to control the growth of weeds. The necessity to use pre-emergent shall be at the discretion of the District's inspector, and the type and method of use of the pre-emergent shall be submitted by the Permittee for review and approval by the District's inspector prior to use. Please contact the Supervising Agricultural Standards Officer for the San Bernardino County Agriculture Department at (909) 387-2131 with any questions or concerns regarding the proper application of the required pre-emergent.

50. The Permittee is hereby advised that the District's inspector shall make routine, periodic visits to the construction site commencing upon the date of Permit issuance. Such site inspections shall be performed to ensure that Permit activities have not been initiated without proper notification to the District. As such, the District shall have its inspector charge the appropriate time for such site visits, whether work is being performed or not, and inspection fees for the Permit may be assessed accordingly based on the time necessary to conduct the necessary site visits.

51. The exact location of any above ground structure(s) shall be field coordinated with the District's inspector prior to installation.

52. Unless otherwise approved by the District, the hours of operation shall be limited to between 7:00 AM and 5:00 PM, Monday through Friday. No equipment shall be started or operated before 7:00 AM.

53. As the governmental agency permitting construction work that may affect survey monumentation, the Department of Public Works is responsible for ensuring compliance with section 8771 of the California Business and Professions Code. Should any survey monumentation be located during the course of construction and it is further determined that such monumentation will be disturbed or destroyed during construction, a Licensed Land Surveyor, or Registered Civil Engineer authorized to practice land surveying, shall submit a corner record showing pre-construction ties prior to disturbing the monument. When submitting the corner record, please note the following: use a state-approved corner record form; include the permit number on your submittal cover sheet; submit the corner record, along with the $18 filing fee, to the County Surveyor's Office, **not the permitting department.** Please contact the County Surveyor's Office if you need a copy of the approved corner record. Please direct all correspondence or inquiries regarding this process to the Land Surveyor's Office at (909) 387-7990.

54. The Permittee shall comply with all provisions of the Migratory Bird Treaty Act and related California Department of Fish and Wildlife regulations pertaining to the protection of nesting birds and birds of prey when conducting any activities within District right-of-way.

55. ELECTRONIC SIGNATURES -The Parties agree that this Permit may be executed in counterparts, each of which shall be deemed to be an original, but both of which together shall constitute one and the same instrument, and that a photocopy or facsimile may serve as an original. If this Permit is executed in counterparts, no signatory hereto shall be bound until both the parties have fully executed a counterpart of this Permit. The Parties shall be entitled to sign and transmit an electronic signature of this Permit (whether by facsimile, PDF, or other email transmission), which signature shall be binding on the party whose name is contained therein. Each Party providing an electronic signature agrees to promptly execute and deliver to the other party an original signed Permit upon request.

56. Please note that any improvements constructed within the District's right-of-way while it's in an "interim condition", it will be the responsibility of the Permittee to relocate or adjust these improvements once the District proceeds with its "ultimate condition" improvements.

Revised 08/15/2023