

**SPECIFICATIONS - DETAILED PROVISIONS**  
**Section 00220 - Soils Investigation**

**C O N T E N T S**

<b>PART 1 - GENERAL</b> .....	<b>1</b>
1.01 DESCRIPTION.....	1
1.02 DEFINITIONS.....	1
1.03 REQUIREMENT .....	1
1.04 PAYMENT .....	4
<b>PART 2 - PRODUCTS</b> .....	<b>4</b>
2.01 MATERIALS.....	4
<b>PART 3 - SCOPE</b> .....	<b>4</b>
3.01 DESIGN PHASE.....	4
3.02 CONSTRUCTION PHASE.....	8
<b>PART 4 - EXECUTION</b> .....	<b>10</b>
4.01 DIRECTION OF WORK .....	10
4.02 PERFORMANCE .....	10



**SECTION 00220  
SOILS INVESTIGATION**

**PART 1 - GENERAL**

1.01 DESCRIPTION

Soils Investigation is that soils field work required for the preliminary engineering involved in the design of a specific construction project and/or that soils field work required during the project construction phase, and includes any follow-up work required to confirm as-built conditions, and pertinent office preparation.

1.02 DEFINITIONS

- A. District shall mean the Eastern Municipal Water District, and shall include authorized representatives of the District.
- B. Consultant shall collectively mean the individual or firm contracting with the District to perform the services required by the contract.

Consultant shall be considered the prime contractor. In the event the Soils Engineer, as prime contractor, contracts with a surveying firm or with trenching, boring, earth moving, or other firm, those firms shall be considered subcontractors.

1.03 REQUIREMENT

- A. Prevailing Wage. In accordance with the provisions of the California Labor Code Section 1773.2, the Director of Industrial Relations has ascertained the general prevailing rates of wages and the general prevailing rates for legal holiday and overtime work in Riverside County for those classifications that may be applicable to subcontract work utilized by Consultant as prime contractor. Copies of said rates are on file at the office of the District, which copies shall be made available for review to any interested party upon request. Consultant shall require the posting of such determinations at the job site by subcontractors when appropriate.
- B. Travel and Subsistence Payments by subcontractors shall be made to each worker as appropriate, as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with the requirements of Section 1773.8 of the California Labor Code.

- C. Penalty for Payment Violations. Consultant shall forfeit, or require the forfeit by his subcontractor, as a penalty to the District \$25.00 for each calendar day, or portion thereof, for each worker paid less than the said stipulated prevailing rates for any work done under the contract by any subcontractor under him, in violation of the provisions of the California Labor Code Section 1775 for transmittal to the State Treasurer 90 days after acceptance of the work, and Consultant shall require that the difference between such prevailing wage rates and the amount paid shall be paid to each affected worker.
- D. Payroll Records/Apprentice Employment/8-Hour Day. It is the responsibility of Consultant to require any subcontractors to maintain and make available accurate payroll records pursuant to the requirements of Labor Code Section 1776; and to meet the apprentice employment requirements of Section 1777.5; and to adhere to the 8-hour legal day's work and overtime pay requirements of Section 1810 through 1813 and 1815.
- E. Insurance Required. Consultant shall not commence work under this contract until he has obtained all policies of insurance required hereunder, nor shall he allow any subcontractor to commence work on his subcontract, until all policies of insurance required of the subcontractor have been obtained.

Consultant shall, during the life of this contract, notify District in writing of any incident, either under his jurisdiction, or any of his sub-contractors, giving rise to any potential Bodily Injury or Property Damage claim and any resultant settlements, whether in conjunction with this or any other project which may affect the limits of the required coverage, as soon as is reasonable and practical.

Consultant shall take out and maintain the required insurance policies at his sole cost and expense at all times during the life of this contract. Each such policy of insurance shall:

1. Be produced by agents/brokers that are licensed to transact insurance business in the State of California;
2. Be issued by insurance carriers that are:
  - a. Licensed by the State of California to write business in this state;
  - b. Rated no less than "A-, Class VIII" or better by the A.M. Best Company;

Any insurance carrier, which is strategically affiliated with a parent insurance company or insurance group, must disclose the name of the parent company or group in any certificate of insurance documentation provided to District.

Non-admitted/Surplus Lines insurance carriers (carriers not licensed in the State of California), may be acceptable to District under certain conditions. Non-admitted insurance carriers providing any form of insurance coverage must be:

- a. Domiciled in the United States; and,
- b. Listed as an approved carrier on the California Department of Insurance L.E.S.L.I. list; and,
- c. Rated no less than "A-, Class VIII" or better by the A.M. Best Company.

District reserves the right to disqualify any non-admitted insurer at any time without cause.

3. Name and list District as "Additional Insured," by an endorsement executed by the insurance carrier; (this requirement does **not** apply to Professional Liability or Workers' Compensation Insurance);

4. Specify that it acts as primary insurance (except professional liability and worker's compensation) and that no insurance held or owned by the additional insured shall be called upon to cover a loss under said policy;

5. Not be canceled until thirty (30) days, (10) days written notice for non payment of premium) after receipt by the District of a written notice of such cancellation, as evidenced by receipt of a registered letter. Consultant shall provide a thirty (30) days written notice to District prior to implementation of a reduction of limits or material change of insurance coverage as specified herein.

6. Show evidence of renewal of an expiring policy once the insurance has been approved by District. Prior approval must be obtained if the coverage or limits of the policy or the carrier has changed.

**Insurance Limits.** The District requires Consultant to insure against consequences of a professional act, error or omission and to provide the District with evidence that the following policies and limits are in force:

Workers' Compensation	Statutory
General Liability	\$1,000,000
Professional Liability	\$1,000,000
Automobile Liability	\$1,000,000

1.04 PAYMENT

Shall be made pursuant to receipt of billing to be submitted within 35 days following performance of the work, clearly identifying the work performed and the billing period covered by the invoice, and indicating purchase order, work order, and construction order numbers as applicable, accompanied by daily time sheets for field work when applicable.

**PART 2 - PRODUCTS**

2.01 MATERIALS.

All materials required for any services performed under this specification shall be furnished by and at the expense of Consultant as part of the Contract under which the work is performed.

**PART 3 - SCOPE**

The services to be provided by Consultant shall include, but are not limited to:

3.01 DESIGN PHASE

A. BUILDINGS AND MISCELLANEOUS

1. Recommendations on types of foundations and depths.
2. Recommended soil bearing pressures for continuous and/or spread footings as a function of footing widths and depths.
3. If piles are required, recommended types of piles, method for determining driving resistance, pile capacity curves and group efficiency.
4. Retaining walls--equivalent fluid pressure on cantilever and basement-type walls for level and sloping backfill (drained and undrained).
5. Compaction requirements and methods for backfill.
6. Drain materials specification for backfill material behind retaining walls.
7. Passive pressure.
8. Friction factor and statement whether friction may be combined with passive pressure.
9. Depth to groundwater found.

10. Dewatering requirements based on actual depth of groundwater found (if seasonal changes in groundwater elevation may occur, please so state.) **Do not estimate expected GPM.**
11. Borings shall be located as recommended by Consultant.
12. In case of buried or deep structures, such as lift stations, at least two (2) borings shall be made.
13. Depth of borings shall be at least five (5) feet below any foundation.
14. Provide complete boaring logs, including type of soil (based on the Uniform Soil Classification System), field density, cohesion, angle of internal friction, groundwater level at each boring, and moisture content.
15. Statement of expected cut slopes for structure excavation or data for Contractor's design of shoring (braced or unbraced).
16. Structure settlements--total and differential, including settlement versus time.
17. Subbase requirements for foundations
18. Site preparation requirements including specifications for use of on-site or imported fill materials.
19. Corrosion problems due to soluble salts in the soil.
20. Embankment slopes.
21. Erosion control for slopes.
22. Percolation data, where applicable.
23. Statement of known earthquake faults in the area and geologic-seismic features of the area with recommended seismic design acceleration including recommended design elastic response spectra for various percentages of critical damping.
24. Slope stability analysis for buried reservoirs including lining and drain requirements.
25. Core drill existing pavement to determine thickness of asphalt and thickness and classification of structural section.

26. Pavement recommendations, including thicknesses and course classification.
27. Review project site preparation and foundation plans and earthwork specifications prior to construction bidding.

B. STEEL OR CONCRETE TANKS

1. Site clearing and grubbing requirements.
2. Tank site preparation requirements for tank foundation including special requirements for valve boxes, pipe encasement, etc.
3. Recommended underdrain system and drain material specifications.
4. Allowable soil bearing pressures for ringwall and interior column footings.
5. Lateral earth pressure against tank walls for buried tanks.
6. Excavation and compaction requirements for the site. Specifications for fill (on-site or imported).
7. Friction factor for foundations subjected to lateral loads.
8. Allowable passive pressure for footings and thrust blocks.
9. Statement of expected cut slopes for excavations and data for Contractor's design of shoring (braced or unbraced).
10. Corrosion problems due to soluble salts in the soil.
11. Special requirements for protection of concrete or structural steel tank walls for buried portion of the tank.
12. Depth to groundwater found.
13. Tank settlements including the effect of loading and unloading with water.
14. Statement of known earthquake faults in the area and geologic-seismic features of the area with recommended seismic design acceleration including recommended design elastic response spectra for various percentages of critical damping.
15. Pavement recommendations including thickness and course classification.



16. Review project site preparation and foundation plans and earthwork specifications prior to construction bidding.

C. PIPE TRENCHES AND JACKING PITS

1. Borings along the trench alignment shall be located where recommended by the consultant based on his review of the site topography and geology.
2. Depth of borings shall be at least 5 feet below pipe invert listed.
3. Provide complete boring logs including type of soil (based on the Uniform Soil Classification System), field density, cohesion, angle of internal friction, groundwater level at each boring, and moisture content.
4. Recommended safe construction slopes for pipe trench excavation with side slopes based on slope stability. Include effects of surcharge loads located at or near the top of the slope (construction equipment, spoil bank, etc.) and limitations or surcharge loads.
5. Allowable passive pressure for thrust blocks including permissible increase for "test" conditions in pipeline (short term) for pressure pipelines.
6. Allowable bearing pressure for anchor blocks; friction resistance for anchor and thrust blocks; and statement whether frictional and passive resistance can be combined for pressure pipelines.
7. Frictional resistance for buried pipes in soil where pipeline anchorage will be obtained by soil-pipe friction for pressure pipelines.
8. Lateral earth pressure for sheeting and shoring design for trenches and jacking pits using braced shore construction with level or sloping backfill behind the shoring. Include effects of adjacent surcharge loads.
9. Allowable bearing pressure and lateral pressures for permanent structures.
10. Buoyant weight of soil that may be used to resist uplift on structures and pipeline for groundwater conditions.
11. Predicted scour depth for channel and/or river crossings.
12. Depth to groundwater found.
13. Dewatering requirements.

14. Corrosion problems due to soluble salts in the soil.
15. Settlement of pipe (during and after construction).
16. Seismic considerations for pipe including special construction recommendations.
17. Review project drawings and earthwork specifications prior to construction bidding.
18. Core drill existing pavement to determine thickness of asphalt and thickness and classification of structural section.
19. Pavement recommendations, including thicknesses and course classification.

### 3.02 CONSTRUCTION PHASE

#### A. BUILDINGS AND MISCELLANEOUS

1. Provide full time observation during grading, excavation, backfilling of trenches, behind retaining walls, and around deep structures. **Refer to Specification Section 02201 - Construction Methods & Earthwork for details.**
2. Verify and approve the depth of removal of soils beneath foundations and behind retaining walls.
3. Where site conditions are different from those observed during the design phase, such as different soil types and/or different elevation of ground water, consult with the inspector and engineer and make recommendations.
4. Provide full time inspection and testing of placement and compaction of all backfill materials **per ASTM Standard D-1556 or D-2922.**
5. Perform laboratory testing of backfill material to determine optimum conditions for compaction **per ASTM Standard D-1557.**
6. Perform concrete cylinder fabrication and testing **per ASTM Standard C-157.**
7. Provide final report of all changed site conditions and test results.

B. STEEL OR CONCRETE TANKS

1. Provide full time observation during rough and fine grading of the tank site, and during excavation and backfilling behind retaining walls, and around deep structures. **Refer to Specification Section 02201 - Construction Methods & Earthwork for details.**
2. Verify and approve the required over-excavation and recompaction of soils beneath foundations and behind retaining walls.
3. Where site conditions are different from those observed during the design phase, such as different soil types and/or different elevation of ground water, consult with the inspector and engineer and make recommendations.
4. Provide full time inspection and testing of placement and compaction of all backfill materials **per ASTM Standard D-1556 or D-2922.**
5. Perform laboratory testing of backfill material to determine optimum conditions for compaction **per ASTM Standard D-1557.**
6. Perform concrete cylinder fabrication and testing **per ASTM Standard C-157.**
7. Provide final report of all changed site conditions and test results.

C. PIPE TRENCHES AND JACKING PITS

1. Provide full time observation during excavation, installation of pipe bedding material, and backfilling of the trench. **Refer to Specification Section 02201 - Construction Methods & Earthwork for details.**
2. Verify and approve the required over-excavation and recompaction of soils in the pipe zone.
3. Where site conditions are different from those observed during the design phase, such as different soil types and/or different elevation of ground water, consult with the inspector and engineer and make recommendations.
4. Provide full time inspection and testing of placement and compaction of all backfill materials **per ASTM Standard D-1556 or D-2922.**
5. Perform laboratory testing of backfill material to determine optimum conditions for compaction **per ASTM Standard D-1557.**
6. Provide final report of all changed site conditions and test results.

**PART 4 - EXECUTION**

4.01 DIRECTION OF WORK

Except as otherwise stated in the purchase order or other contract for the work, all work shall be under the direction of one of the following District representatives. Questions relative to the specific work shall be directed to that representative.

- A. The appropriate Designer for preliminary engineering investigations; in general this will be the originator of the purchase order or contract.
- B. The Engineering Inspector Supervisor or his designee for construction engineering investigations; in general this will be the Inspector.

4.02 PERFORMANCE

Results of soils investigations shall be furnished to the District pictorially for inclusion in the contract documents for project construction purposes and/or tabulated for convenient reference, as designated in the purchase order or in the request for proposals.

Tabulated results of soils compaction tests shall be delivered **within 48 hours** to facilitate further construction scheduling.

In addition to the test results, all reports shall clearly identify the project name, project Work Order or Construction Order (as applicable), the name of the Project Engineer for projects in design, or the Project Inspector for projects under construction, the date of all tests, and the date of the latest revision to the report.

Three copies of the tabulations shall be delivered to the Design Engineer, or to the District's Inspector for further distribution to the construction contractors, and one copy shall be delivered directly to the District office for the project file.

**END OF SECTION 00220**