PART 1 - GENERAL

1.01 DESCRIPTION

This section includes materials, installation and testing of earthwork for excavations, fills and embankments for structures and sites.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. Clearing, Grubbing, and Stripping: STD SPEC 02110.
- D. Blasting: STD SPEC 02228.
- E. General Concrete Construction: STD SPEC 03000.

1.03 EARTHWORK AND REPAIRS IN CITY, COUNTY, AND STATE RIGHTS OF WAY

Conform to the requirements and provisions of the permits issued by those agencies in addition to the requirements of these Standard Specifications. If a permit is not required, earthwork and repairs shall conform to the standards of the agency in whose right of way the work is done in addition to the requirements of these Standard Specifications.

1.04 SAFETY PRECAUTIONS

Observe safety precautions in all phases of the work. Included shall be trench shoring, bracing, lighting, and barricades as dictated by reason and by the Safety Orders of the Division of Industrial Safety, State of California (CAL/OSHA). Acquire an exemption letter or trenching permit from the California Division of Industrial Safety (CAL/OSHA) and comply with Labor Code Section 6705, Excavation Plans For Worker Protection. Submit a copy of the exemption letter or trenching permit with excavation drawings to the District prior to excavation work.

1.05 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit a report from a testing laboratory verifying that imported material is asbestos-free and conforms to the specified gradations or characteristics.

1.06 TESTING FOR COMPACTION

A. The District or the agency having jurisdiction over the area of the work will require the Contractor to test for compaction as described below.

- B. Determine the density of soil in place by the sand cone method, ASTM D 1556, or by nuclear methods, ASTM D 2922 and D 3017.
- C. Determine laboratory moisture-density relations of soils by ASTM D 1557.
- D. Determine the relative density of cohesionless soils by ASTM D 4253 and D 4254.
- E. Sample backfill materials by ASTM D 75.
- F. "Relative compaction" is the ratio, expressed as a percentage, of the inplace dry density to the laboratory maximum dry density.
- G. Make excavation for compaction tests at the locations and to the depths designated by the District's Representative. Backfill and recompact the excavations at completion of testing. When tests indicate that the compaction is less than the specified relative compaction, rework and retest those areas until the specified relative compaction has been obtained.

1.07 WATER FOR CONSTRUCTION

Water supplied by the District, for whatever needs and uses, shall be paid for in accordance with the rates and rules of the District. The only exception is by written agreement with the District.

PART 2 - MATERIALS

2.01 NATIVE EARTH BACKFILL

Native earth backfill shall be excavated fine grained materials or loose soil free of asbestos, from organic matter, roots, debris, rocks larger than 6 inches in diameter, clods, clay balls, broken pavement, and other deleterious materials.

2.02 IMPORTED FILL MATERIAL

Imported fill material for embankment construction shall be free of asbestos, organic matter, and other deleterious substances and shall not contain rocks or lumps larger than 6 inches in the greatest dimension. The District's Representative and his authorized agent will evaluate the proposed imported fill material prior to placement.

2.03 GRANULAR MATERIAL FOR STRUCTURAL BACKFILL

A. Granular material for structural backfill shall be free of asbestos, organic materials, clay balls, and shall have the following gradation:

Sieve Size	Percent Passing By Weight
2/1 in ch	100
3/4-111011	100
1/2- inch	95 - 100
3/8-inch	50 - 100
No. 4	20 - 65
No. 8	10 - 40
No. 40	0 - 20
No. 200	0 - 5

- B. Whenever the phrase "structural backfill material" is used in these Standard Specifications, it shall mean granular material for structural backfill as described above.
- C. Excavated material may be used for structural backfill provided it conforms to the Standard Specifications for structural backfill material.

2.04 WATER FOR COMPACTION

Water used in compaction shall have a maximum chloride concentration of 500 mg/l, a maximum sulfate concentration of 500 mg/l, and shall have a pH of 7.0 to 9.0. Water shall be free of acid, alkali, or organic materials. Salt water will not be allowed.

PART 3 - EXECUTION

3.01 COMPACTION REQUIREMENTS

Unless otherwise shown on the Drawings, otherwise described in the Specifications or required by an agency having jurisdiction over the area of the work, compaction of fill areas and embankments shall be a minimum of 90% relative compaction.

3.02 BLASTING

Perform blasting operations in accordance with Standard Specification Section 02228.

3.03 SITE PREPARATION

Clearing, grubbing, and stripping shall conform to Standard Specification Section 02110. Prior to excavation, clear the existing ground surface at the work site.

3.04 SITE PROTECTION

A. Protection of the site during the period of grading shall be the responsibility of the Contractor. Protect the work site from flooding, ponding, or inundation during site clearing, excavation, and grading. Make temporary provisions during the rainy season to adequately direct surface drainage away from and off the work site. Dispose of the water in a manner to prevent damage to adjacent property and in accordance with regulatory agency requirements.

- B. Use plastic sheeting to prevent unprotected slopes from becoming saturated. Install checkdams, desilting basins, riprap, sand bags, or other devices or methods necessary to control erosion.
- C. Following periods of rainfall, the District's Representative and his authorized agent will visually assess rain related damage. At the request of the District's Representative, the Contractor shall make excavations in order to evaluate the extent of rain related damage.
- D. Rain related damage will be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions identified by the District's Representative and his authorized agent.
- E. Where soil has been adversely affected by rain related damage, it shall be overexcavated and replaced with compacted fill or other remedial grading as directed by the District's Representative.

3.05 DEWATERING

Provide and maintain means and devices to remove and dispose of all water entering the excavation during the period when concrete is being deposited and during the hydration process, when pipe is being laid, and during the placing of backfill. Avoid settlement or damage to adjacent property. Dispose of water in a manner that will not damage adjacent property. When dewatering open excavations, dewater from outside the structural limits and from a point below the bottom of the excavation. Obtain and comply with discharge permit from cognizant regulatory authority.

3.06 EXCAVATION

- A. Perform all excavation regardless of the type, nature, or condition of the material encountered to accomplish the construction. Do not operate excavation equipment within 5 feet of existing structures or newly completed construction. Excavate with hand tools in these areas.
- B. After the required excavation has been completed, the District's Representative will inspect the exposed subgrade to determine the need for any additional excavation. It is the intent that additional excavation be conducted in all areas within the influence of the structure where unacceptable materials such as soft, spongy or deleterious materials exist at the exposed subgrade. Overexcavation shall include the removal of all such unacceptable material that exists directly beneath the structure or within a zone outside and below the structure defined by a line sloping at 1 horizontal to 1 vertical from the outside edge of the footing. Refill the overexcavated areas with structural backfill material.

3.07 LIMITS OF EXCAVATION FOR FOUNDATIONS, VAULTS, AND STRUCTURES

Excavate to the depths and widths needed to accomplish the construction. Allow for forms, working space, structural backfill and site grading. Do not carry excavation for footings, slabs or conduits deeper than the elevations shown, unless unacceptable material is encountered. Backfill overexcavations, below the elevations shown to the proper elevation, with structural backfill material compacted as specified for structural backfills around structures. Correct cuts below grade by similarly cutting adjoining areas and creating a smooth transition.

3.08 PREPARED SUBGRADE FOR FOUNDATIONS, VAULTS, AND STRUCTURES

Excavate and shape subgrade to line, grade, and cross section. Compact exposed subgrade until the top 12 inches are compacted to 95% relative compaction. Remove soft or fractured material encountered and replace with structural backfill material. Fill holes, open joints, rock fractures, and depressions created by the excavation to the required line, grade, and cross sections with structural backfill material. Place a 6-inch minimum thickness of structural backfill material over the full width of the foundations, vaults, and structures and compact to 95% relative compaction. Extend the structural backfill material and compaction 12 inches beyond the edge of the foundations, vaults, and structures. The finished subgrade shall be within a tolerance of +/-0.08 of a foot of the grade and cross section shown, shall be smooth and free from irregularities, and shall be at the specified relative compaction.

3.09 PLACING STRUCTURAL BACKFILL MATERIAL

- A. Remove form materials and trash from the excavation before placing any fill material. Obtain the specified compressive strength and finish of concrete work per Standard Specifications Section 03000 before backfilling.
- B. Do not operate earthmoving equipment within 5 feet of walls of concrete structures. Place and compact backfill adjacent to concrete walls with hand-operated tampers or other equipment that will not damage the structure.
- C. Place structural backfill material around piping, structures, and other areas, including authorized overexcavation areas, to the lines and grades shown or specified. Do not exceed loose lifts of 8 inches. Compact each lift to a minimum of 90% relative compaction, unless otherwise shown. Stop backfill at least 6 inches below finished grade in all areas where topsoil is to be replaced.
- D. Place native earth backfill to the lines and grades shown in the areas that are not required to receive structural backfill material. Place native earth backfill in maximum 8-inch loose lifts and compact each lift to a minimum of 90% relative compaction, unless otherwise shown.

3.10 PLACING FILL MATERIAL IN EMBANKMENTS

- A. Existing surfaces to receive fill material shall be keyed and benched. Excavate horizontal keys and vertical benches into the slope area to receive fill material. Keying and benching shall provide at least 10-foot wide benches and a minimum of 4 feet of vertical bench height within the firm subgrade.
- B. Native earth backfill and imported fill material shall be used for embankment construction. Remove all deleterious materials. Highly organic topsoils and deleterious vegetative materials shall be segregated and not incorporated into the fill soils.
- C. Place fill at optimum moisture content.
- D. Place fill in maximum 8-inch lifts and compact each lift to 90% relative compaction.

E. Compact fill slopes by sheepsfoot rollers, by trackwalking with a dozer, or by other suitable equipment. Compact slopes until in-place density tests indicate a relative compaction of at least 90% at a horizontal distance of 2 feet from the slope face.

3.11 MOISTURE CONTROL OF EARTH FOR BACKFILLS AND EMBANKMENTS

During the compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of the backfill material. Maintain moisture content uniform throughout the lift. Insofar as practicable, add water to the material at the site of excavation. Supplement by sprinkling the backfill material. At the time of compaction, the water content of the material shall be at optimum water content or within 2 percentage points above optimum. Aerate material containing excessive moisture by blading, discing, or harrowing to hasten the drying process.

3.12 FINISH GRADING

Perform earthwork to the lines and grades shown on the Drawings. Remove exposed roots and loose rocks exceeding 3 inches in diameter. Round tops of banks to circular curves to not less than a 6-foot radius. Neatly and smoothly trim rounded surfaces.

3.13 DISPOSAL OF EXCESS EXCAVATED MATERIAL

Dispose of excess excavated material offsite. Contractor shall make his own arrangements for the disposal of the excess material and bear all costs incidental to such disposal.

3.14 FINAL CLEAN-UP

After finish grading, make surfaces free of all cleared vegetation, rubbish and other construction wastes. Dispose of all exposed roots and excavated or surface rocks. Do not dispose of rocks within the work site by burying.

END OF SECTION