

NORTH MARIN WATER DISTRICT

STANDARD SPECIFICATIONS

SECTION 02200 EARTHWORK

PART 1 GENERAL

1.01 DESCRIPTION

Scope Covered By This Specification

The work to be performed applies to the furnishing of all plant, labor and equipment for site clearing, stripping and rough grading, structural excavation and backfill, finish grading, and road construction, all as shown on the design drawings and as further specified herein, including but not limited to:

- A. Surveying to necessary lines and grades to perform the work.
- B. Removal of trees and other vegetation.
- C. Clearing and grubbing.
- D. Stripping and stockpiling topsoil.
- E. Removing any above grade or below grade improvements as necessary.
- F. Protecting any above grade or below grade improvements as necessary.
- G. Excavating to lines, grades and elevations as shown on the design drawings.
- H. Removing and hauling excavated material to disposal areas or stockpiles for use as backfill.
- I. Hauling material from stockpiles or borrow areas to points of placement.
- J. Placing and compacting backfill material.
- K. Furnishing, placing and compacting subgrade and base course materials for roads and paved areas.
- L. Constructing shoulders and slopes.

Scope Not Covered By This Specification

- Trenching and backfilling for pipelines.
- Landscaping.

1.02 REFERENCED CODES AND STANDARDS

Unless otherwise specified herein or shown on the drawings, work under this Specification shall be performed in accordance with the following codes and standards in force on the date of award of the Subcontract to which this specification is a part thereof:

ASTM D 422	Standard Method for Particle-Size Analysis of Soils
ASTM D 1556	Standard Test Method for Density and Unit Weight of Soil In-Place by the Sand-Cone Method
ASTM D 1557	Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop
ASTM D 2487	Standard Method for Classification of Soils for Engineering Purposes
ASTM D 2922	Standard Test Methods for Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
CAL/OSHA Title 8, Div. 1, Chapter 4, Subchapter 4	Construction Safety Orders
SS-26	Aggregate Bases

1.03 RELATED WORK SPECIFIED ELSEWHERE

NMWD Standard Specifications 01000, 02202, 02223, 02700

PART 2 MATERIALS

2.01 TOPSOIL

Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4". Satisfactory topsoil is reasonably free of subsoil clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots, trash and other unsuitable material.

2.02 FILL MATERIAL

Fill material, including common backfill, structural or select backfill, and subgrade material, shall be sound, dense and durable material obtained from the required excavation. Fill material shall be free of rock or gravel over 6" in the greatest dimension, organic material, roots, trash, frozen soil or any similar unsuitable material. When materials are not available from required excavations, materials shall then be obtained from designated borrow areas.

Fill material shall contain less than 50% by weight passing the No. 200 sieve and be classified as coarse grained soil in accordance with ASTM D-2487.

Materials with more than 50% by weight passing the No. 200 sieve, classified as fine grained soils in accordance with ASTM D-2487, encountered in the excavation or designated borrow areas are unsuitable for use as fill material.

2.03 AGGREGATE BASE

Aggregate base material shall conform to SS 26-1.02B. The combined aggregate shall conform to the grading specified for 3/4" maximum size aggregate.

2.04 HYDRO SEED MIX

See Section 2202, parts 2.02 and 2.03.

PART 3 EXECUTION

3.01 SURVEY REQUIREMENTS

The District will establish a baseline and reference bench mark in the vicinity of the work to be performed.

The contractor shall preserve all stakes, existing monuments and bench marks.

The contractor shall be responsible for all location and layout surveying associated with the scope of work other than establishment of a baseline and reference bench marks.

The District reserves the right to make a separate survey check of the work at any time and the Contractor shall cooperate with the District in checking work quantities. The Contractor shall be responsible for staking, measuring, and computing all quantities and units.

3.02 SITE CLEARING AND STRIPPING

Remove trees, shrubs, grass and other vegetation, improvements or obstructions, within the limits of the work as shown on the design drawings. Completely remove

stumps, tree roots larger than 1" in diameter, and other below grade debris. The upper 2 feet of soil in the root area should be overexcavated.

Any trees or shrubs within the limits of the work, to be preserved shall be noted on the design drawings and physically marked by the District.

Completely remove those underground pipe or conduits designated for removal as shown on the design drawings.

Those underground pipe or conduits to remain shall be protected to not disturb their function during the work.

Stripping shall consist of the removal of all topsoil and organic material within the limits of the work as shown on the design drawings. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying soil or other objectionable material.

Stockpile topsoil in storage piles in the vicinity of the work site as approved by the District. Construct storage piles to freely drain and not impound surface water. Cover storage piles as required to prevent wind blown dust.

Cleared debris, including trees, shrubs, stumps, roots, large rocks and other unsuitable material shall be hauled from the site and disposed of at an approved, off-site disposal area.

Burning of cleared debris is not permitted.

3.03 ROUGH GRADING AND EXCAVATION

Road subgrade and ditches shall not vary more than plus or minus 0.10 feet from the established grade and cross section.

Permanent cut slopes shall be no steeper than 2:1 and left rough graded. There shall be no trimming of the cut slope with grader, dozer, or other cutting blade. The cut slope shall be raked down as the cut slope is made to remove all clods, rocks and loose material.

Cut slopes shall not vary more than plus or minus 0.5 feet from the established grade and cross section as shown on the design drawings.

Site specific information on the soils expected to be encountered in performance of this work is provided in the Special Conditions.

Excavation shall include all materials encountered within the limits shown on the drawings, regardless of their nature or the manner in which the material is removed.

All excavated material suitable for fill shall be stockpiled or immediately placed in required fill areas. Excess excavated material shall be hauled to an approved disposal area.

Unsuitable material, as determined by the District, encountered at the sides or bottom of the excavation shall be removed and hauled to an approved disposal area. The extent of removal of such material shall be as directed by the District.

Water in excavations shall be controlled and removed. Excavation below grade shall be conducted so as to cause water to run to a low corner where it can be pumped out and will cause the least damage. Discharge from pumps shall be at locations to avoid erosion.

Overexcavation, beyond tolerances specified herein, shall be backfilled to grade in accordance with requirements for fill specified herein.

Excavation for tank pads and pump station foundations shall conform to the lines, grades and elevations shown on the drawings with allowable tolerance of minus zero to plus 0.2 feet.

The Contractor shall provide temporary erosion control in work areas as necessary.

The Contractor shall control dust in work areas to prevent damage to adjacent property and preclude any nuisance to property owners or other Contractors.

Excavated areas to be backfilled shall be maintained in a clean condition free from leaves, brush, sticks, trash and other debris.

Excavations shall comply with CAL/OSHA requirements.

3.04 BORROW MATERIAL

Borrow materials shall be obtained from the borrow area(s) designated by the District. Approval of other sources selected by the Contractor may be requested in writing from the District.

In transporting borrow material, the Contractor shall avoid spillage from trucks onto the road. Spilled material shall be removed immediately by the Contractor.

All borrow areas shall be graded for drainage at the end of each work day.

3.05 FILLS

Fills shall be constructed to lines and grades shown on the drawings. The material shall be placed in successive horizontal layers not to exceed 12" in loose depth for the full width of the cross section and shall be compacted to the percentage of maximum dry density specified herein. For areas not accessible to heavy compaction equipment, fill materials shall be placed in horizontal layers not to exceed 6" in loose depth and compacted with hand tools.

An area shall receive fill only after the area has been stripped and the in-situ soil compacted to the density specified herein. Any soft spots shall be removed and replaced with backfill as specified herein.

Material shall be placed in filled areas so that, when compacted, it forms a homogeneous mass, free from lenses, pockets, streaks, and layers of material differing substantially in texture and gradation from surrounding fill material. The surface of each compacted layer shall be scarified to a minimum depth of 2" before placing the next layer. If the fill surface softens as a result of heavy rains, the surface shall be scarified and allowed to dry until the moisture content is suitable for the compaction specified.

All necessary work shall be performed to adjust the moisture content of the fill material to the range suitable for the compaction specified. This shall include but not be limited to adding water, spreading, scarifying and mixing to wet or dry the soil to reach the moisture content range suitable for the compaction specified.

Material to be compacted shall whenever possible be moisture conditioned in the stockpiles or borrow sources.

Moisture content of loose excavation material placed directly into the fill shall be adjusted as necessary to the range suitable for the compaction specified.

Unless specified otherwise herein or on the design drawings, all fill material shall be compacted to 90% of maximum dry density as determined by ASTM D 1557.

Contractor shall grade uncompleted fill areas for drainage and thoroughly compact the surface at the end of each work day.

When concrete has just been placed, Contractor shall wait until the strength of concrete has reached 60% of final compaction before placing backfill against the concrete.

If the subgrade concrete has been waterproofed, the backfilling shall be done so as not to damage the waterproofing or its protective materials.

Backfill within two feet of structures shall be compacted using hand tools.

3.06 BASE COURSE

Aggregate base course shall be provided where shown on the design drawings.

Aggregate base course material shall be delivered as a uniform mixture and spread in layers. Segregation shall be avoided and the base shall be free from pockets of coarse or fine material.

Each layer shall be compacted to a relative compaction of not less than 95% and to a point where no movement (pumping) or rutting can be observed under the load of normal construction equipment.

The surface of the finished base at any point shall not vary more than 0.05 feet above or below the design grade. Pockets of loose rock on the surface will not be accepted. Base which does not conform to the above requirements shall be reworked.

3.07 DUST CONTROL

Take all steps possible to prevent and reduce dust arising from the construction activity. Have adequate water trucks on the site at all times and water, as necessary, the areas where dust may arise. Cooperate fully with the Owner and water immediately, when told to do so. Coordinate with the City of Novato or County of Marin in advance of work to ensure compliance with requirements for haul routes to minimize the impacts on dust control, traffic disruption and safety.

3.08 INSPECTION AND TESTING

The District requires inspection and tests on the fill material to ensure compliance with this Specification. The Contractor shall employ an independent soils testing firm, acceptable to the District, to conduct in-place density and other tests in the compacted fill and the related laboratory compaction testing to determine the relative degree of compaction and other properties. In addition, concurrent with construction, the Contractor will take samples of the material from the borrow or stockpile areas and the independent soils testing firm will test these samples for moisture content and gradation, and carry out any other control or record tests which may be required. Testing will be performed as frequently as deemed necessary. The Contractor shall furnish labor, equipment and materials to obtain samples.

Fill sections failing to meet these specifications shall be removed and replaced or reworked until the required compaction is achieved.

Tests will be performed simultaneously with the construction operations in order that the test results can be used by the Contractor in his operations.

Laboratory maximum density tests will be performed on fill material in accordance with ASTM D 1557 as set forth in this Specification. Prior to filling, at least three tests will be performed on a representative sample of the material to be used. During filling, three laboratory maximum density tests will be performed each time there is evidence of a change in fill material.

At the District's request, gradation tests and Atterberg limits tests will be performed on fill material in accordance with ASTM D 422 and ASTM D 4318. Three gradation tests and three Atterberg limits tests will be performed on each sample used for laboratory maximum density testing. In addition, three gradation tests and three Atterberg limits tests will be performed whenever it appears the material has changed.

In-place density tests will be performed on fill material in accordance with ASTM D 1556, or ASTM D 2922. At least one in-place density test will be performed for each lift to be compacted and at least one test will be performed each day for each area being compacted.

In the event tests indicate that the density does not meet specified requirements, the material shall be reworked until retesting indicates that the compacted material meets these Specifications.

END OF SECTION

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