

# **NORTH MARIN WATER DISTRICT'S STANDARDS**

## **STANDARD SPECIFICATIONS**

### **SECTION 02202 SLOPE PROTECTION AND EROSION CONTROL**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

This section includes materials and installation for slope protection and erosion control.

##### **1.02 REFERENCE STANDARDS**

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

ACI 301	-	Specifications for Structural Concrete for Buildings
ACI 318	-	Building Code Requirements for Reinforced Concrete
ASTM A 185	-	Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM C 90	-	Standard Specification for Load-Bearing Concrete Masonry Units
ASTM C 150	-	Standard Specification for Portland Cement
ASTM C 476	-	Standard Specification for Grout for Masonry
ASTM C 615	-	Standard Specification for Granite Dimension Stone
ASTM E 162	-	Standard Test method for Surface Flammability of Materials Using a Radiant Heat Energy Source

##### **1.03 RELATED WORK SPECIFIED ELSEWHERE**

NMWD Standard Drawings  
NMWD Standard Specifications 01000, 02223, and 15000

##### **1.04 LOCAL AND STATE AGENCY REQUIREMENTS**

Slope protection and erosion control shall be accordance with the requirements of the Agency of Jurisdiction, the Regional Standards, and the Regional Water Quality Control Board.

#### **PART 2 MATERIALS**

##### **2.01 CUT-OFF WALLS**

Cut-off walls shall be as shown in the Standard Drawings and /or construction drawings. The following materials are acceptable for the various configurations in the construction of the walls, as shown on the drawings:

- A. Portland Cement: Cement shall be Type II per ASTM C 150.
- B. Concrete: Per ACI 301. Compression strength shall be 2500 PSI minimum (560-D-3250) with four (4) inches slump maximum. All admixtures (i.e. air-entraining, accelerators, water-reducing or pozzolan, etc.) shall be per manufacturer's recommendations. Calcium chloride shall not be used in concrete.
- C. Masonry: All masonry units shall conform to ASTM C 90, with a minimum compression strength of 1500 PSI minimum @ 28 days.
- D. Reinforcing Steel & Welded Wire Fabric: Bars shall be per ASTM A 615, Grade 60. Fabric mesh shall be per ASTM A 185. Reinforcing steel and welded wire fabric shall be installed in accordance with the Standards Drawings.
- E. Mortar: Mortar shall consist of 1 part Portland cement, 1/4 to 1/2 part lime putty or hydrated lime, and sand equal to 2 1/4 to 3 times the sum volumes of cement and lime used and shall conform to ASTM C 476. Mortar compressive strength shall be 1800 PSI minimum @ 28 days.

**2.02 SEED MIX (HAND SEEDED)**

Where a prescribed seeding or planting palette has not already been designated by the general land-use agency for the project, a site-specific seed mixture list is to be prepared by the Contractor and presented to the District for comment and approval prior to the purchase of any seed and/or planting materials. An example of a seed mixture list for re-vegetation is as follows:

Composition:

PLS* %	Species (Botanical/Common)	Minimum Germ
20%	Nassella pulchra	50
30%	Hordem branchyantherum	50
25%	Bromus Carinatus	50
25%	Elymus glaucus	50
	45 total lbs per acre	

\*PLS = Pure Live Seed

- A. Quality: All seed shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germinations, dealer's guarantee, and dates of test. Prior to seeding at the request of the District, the Contractor shall provide a letter results. of certification, original Association of Official Seed Analysts (AOSA) seed test
- B. All legume seed shall be pellet-inoculated as provided in Bulletin AXT-280 of the University of California Cooperative Extension, "Pellet Inoculation of Legume Seed." Inoculant sources shall be species specific and shall be applied at a rate of 2 pounds of inoculant per one hundred pounds of seed.
- C. Seed mix shall be supplied by Rana Creek Habitat Restoration, Pacific Coast Seed, or approved equivalent.

**2.03 HYDRO SEED MIX**

The hydro seed mix shall be a bonded matrix consisting of wood fiber, fertilizer and high quality live seed (per Item 2.02 above) in the following proportions:

<u>Seed</u>	<u>See SEED MIX above</u>
Fiber mulch	2,000 lbs/acre
Slow release fertilizer 20-10-5	150 lbs/acre
Soil binder	100 lbs/acre

Mix soil binder at the rate of 1 lb per 25 gallons of water.

## **PART 3 EXECUTION**

### **3.01 SURFACE RESTORATION**

A. Hand seeding and hydro seeding: Unimproved areas disturbed during the course of construction shall be reseeded by one of the following methods. Hand seeding may be used when the area to be seeded is 1.0 acre or less. Hydro seeding shall be used on all areas in excess of 1.0 acre. The landscape contractor shall provide all labor, materials, tools and equipment necessary to complete all work as required.

1. Hand seeding shall be performed using the mixture listed above. Seeding shall be performed on prepared topsoil. Depending on the time of year, application of water may be required to speed germination.
2. Hydro seeding shall be performed using the mixture listed above. A landscape contractor licensed to perform this type of work shall install hydro seeding. Preparation of the topsoil and maintenance of the area after seeding shall be performed per the requirements and recommendations of the hydro-seeding contractor. The District, as shown on the Approved Drawings, may require a temporary irrigation system. Apply the hydro seed mixture in the form of slurry consisting of fiber mulch, seed, soil binder, fertilizer, and water. When hydraulically sprayed on the soil surface, the mix shall form a uniform blotter-like ground cover of seed, fertilizer, binder and fiber mulch.

B. Slope Protection:

1. Slopes from 0% to 20%:

Apply hand seeding or hydro seeding per directions described above.

2. Slopes from 20% to 50%:

In addition to the seeding, the following additional slope protection shall be employed:

- a. Erosion Control Blankets:

Erosion control blanket shall be SC150 by North American Green or approved equal.

Erosion control blankets shall be installed per the manufacturer's recommendations.



b. Straw Wattles:

Shall be manufactured from rice straw and be wrapped in tubular plastic netting. The netting shall have a strand thickness of at least .030 inch, and be composed of UV inhibition polyethylene and ethyl vinyl acetate. Wattles shall be 8 to 10 inches in diameter, 25 ft. in length, and weigh a minimum of 35 lbs. Wattles shall be installed in accordance with manufacturer's recommended specifications, which includes but is not limited to: trenched in on contour at the specified interval, secured by wood stakes, and placed and spaced as noted on plans. The ends of adjacent wattles shall be abutted together.

3. Slopes over 50%:

In addition to the seeding, the following additional slope protection shall be employed:

a. Erosion Control Blankets:

Erosion control blanket shall be SC150 by North American Green or approved equal.

Erosion control blankets shall be installed per the manufacturer's recommendations.

b. Straw Wattles:

Shall be manufactured from rice straw and be wrapped in tubular plastic netting. The netting shall have a strand thickness of at least .030 inch, and be composed of UV inhibition polyethylene and ethyl vinyl acetate. Wattles shall be 8 to 10 inches in diameter, 25 ft. in length, and weigh a minimum of 35 lbs. Wattles shall be installed in accordance with manufacturer's recommended specifications, which includes but is not limited to: trenched in on contour at the specified interval, secured by wood stakes, and placed and spaced as noted on plans. The ends of adjacent wattles shall be abutted together.

c. Chevrons:

V-type interception ditches or chevrons shall be installed at twenty-five (25) foot intervals. The ditches shall be twelve (12) inches deep and shall be skewed in a down slope direction at 45<sup>0</sup> on each side of the centerline of the easement (i.e. the higher end of the skewed ditch shall be at the centerline and the lower ends of the ditch shall be at the two edges of the easements).

END OF SECTION