General Conditions and Standard Specifications

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San Diego County Water Authority
SECTION 02110 - CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes the work included in clearing, grubbing, stripping, and mulching to prepare the project site for construction operations, and to salvage topsoil and vegetative material for later revegetation of cleared areas.

B. Perform mulching of vegetative material, stripping of topsoil and salvaging of such within all construction disturbed areas to the limits designated on the Plans and as specified herein. Comply with prohibitions, if any, on the removal of vegetation in accordance with regulatory permit conditions. Comply with seasonal restrictions as indicated on such permits, or as specified herein.

C. The removal and storage of topsoil and existing vegetation is included in the work of this section. Topsoil replacement is included in Section 02200, Earthwork.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200 Earthwork

B. Section 02270 Temporary Erosion Control

C. Section 02510 Access Roads

D. Section 02830 Fencing

E. Section 02940 Revegetation

1.03 SUBMITTALS

A. Storm Water Pollution Prevention Plan in accordance with the National Pollution Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activities prior to commencing clearing and grubbing operations. The erosion and sedimentation control measures included in the SWPPP shall be in accordance with Section 02270, Temporary Erosion Control.

B. Copies of required permits for off-site disposal of cleared material not specified for reuse.

C. List of equipment to be used for clearing, grubbing, stripping and mulching.

1.04 DEFINITIONS

A. Topsoil is defined as the top layer of pre-construction ground surfaces and earthen material, excluding vegetation. Salvage material shall include topsoil and mulched native vegetation.

PART 2 - MATERIALS

2.01 TREE WOUND PAINT

A. Tree wound paint shall be bituminous based of standard manufacture for treating tree cuts and wounds.

2.02 PROTECTIVE FENCING AND ENVIRONMENTAL FLAGGING

A. Protective fencing shall be four foot tall lightweight polypropylene, orange color barrier safety fencing.
B. Environmental flagging shall be single strand fluorescent red or orange color, 3-mil thick, 1-3/16 inch wide vinyl tape.

C. Support posts for protective fencing and environmental flagging shall be four foot tall above grade, placed at maximum spacing of ten feet on center.

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING LIMITS

A. Clear and grub only the areas to be disturbed by excavations, embankments, structures, slabs and roadways. Do not clear and grub topsoil stockpile areas.

B. Existing trees, shrubbery and other vegetation may not be shown on the Plans. Inspect the site prior to beginning of clearing and grubbing operations to document the nature, location, size and extent of vegetation, structures, fencing, pavement, poles, posts, rock outcroppings and other items within the designated area to be cleared, grubbed, stripped, mulched or preserved, as specified herein. Prior to the start of grading, verify with the Engineer the areas where topsoil is to be salvaged and the locations where topsoil will be stockpiled.

3.02 PROTECTION

A. Protect and preserve in place all trees, plants, lawns, structures, and other improvements that are specifically designated on the Plans to be preserved, or are not required to be removed for the performance of the work.

B. Conduct clearing and grubbing operations in a manner that will preserve and protect vegetation beyond the limits of clearing and grubbing. No filling, excavating, trenching or stockpiling of materials shall be permitted within the drip line of the protected vegetation. The drip line is defined as a circle drawn by extending a line vertically to the ground from the outermost branches of the vegetation. To prevent soil compaction within the drip line area, no equipment will be permitted within this area.

C. When protected trees are close together, restrict entry to area within drip line by fencing. In areas where no fence is erected, protect tree trunks two inches or greater in diameter, by encircling the trunk entirely with boards held securely by 12-gauge wire and staples. This protection shall extend from ground level to a height of six feet. Cut and remove tree branches only where such cutting is necessary to effect construction operation. Remove branches other than those required to effect the work to provide a balanced appearance of any tree. Treat scars resulting from the removal of branches with tree wound paint. Replace trees in kind which die as a result of construction work.

D. Prior to the start of clearing and grubbing, schedule and attend a site observation visit with the Engineer to verify existing conditions and the location of environmentally sensitive areas. Erect protective fencing or environmental flagging around environmentally sensitive areas and along the rights-of-way as shown on the Plans and as directed by the Engineer during the site observation visit. Maintain fencing and flagging in good condition for the duration of the work.

3.03 CLEARING

A. Remove trees, stumps, shrubs, brush, limbs and other vegetative growth from areas where topsoil salvaging is not required. Remove evidence of their presence from the surface including sticks and branches greater than one inch in diameter or thickness.

B. Remove all fencing that interferes with construction of new facilities. Where shown on the Plans, salvage fencing materials for later reconstruction or construct new fencing in accordance with Section 02830, Fencing.
3.04 MULCHING OF NATIVE VEGETATION

A. In areas where topsoil salvaging is required, mulch or crush the existing native vegetation into the topsoil prior to salvaging. Native vegetation shall include grasses, brush, and woody materials. Remove rocks, stumps and branches larger than 12 inches and dispose offsite.

B. Mulch vegetative material to a size no larger than six inches long by one inch wide by any mechanical means available. Incorporate and store mulched native vegetation with salvaged topsoil.

3.05 TOPSOIL STRIPPING AND SALVAGING

A. Strip topsoil to a depth of six inches in all disturbed areas, unless otherwise shown or specified. Where the in situ topsoil depth exceeds six inches, and upon written approval of the Engineer, the Contractor may remove suitable topsoil to a depth as directed by the Engineer to meet topsoil replacement requirements described in Section 02200, Earthwork. Do not contaminate topsoil with other excavated materials.

B. Stockpile topsoil within the limit of construction, separate from other excavated materials and pile free of undesirable materials. Place topsoil in elongated piles, or "windrows," no greater than six feet in height. Windrows shall run parallel to the easement edge from which the topsoil was removed, or at offsite locations approved by the Engineer. Keep separate stockpiles of the topsoil and native vegetation that is salvaged from distinct vegetative types.

C. Provide the Engineer with an estimate of the quantity of salvaged topsoil at each stockpile location. Mark stockpiled topsoil with signs noting the location where the topsoil was removed, and the type of vegetation that was mulched.

D. Prior to stockpiling topsoil, spread clean rice straw or crushed native vegetation on the ground surface to delineate between the in-situ and salvaged topsoil.

E. Do not allow weed growth on salvaged topsoil stockpiles. Control weeds in accordance with Section 02940, Revegetation. Do not apply pre-emergent herbicides on topsoil stockpiles. Remove and dispose of any weed growth before weeds produce mature seed heads.

F. If erosion occurs to stockpiled topsoil, or as requested by the Engineer to control erosion, hydrosedge without seed in the stockpile areas in accordance with Section 02940, Revegetation.

G. Protect topsoil stockpiles from intrusion by erecting and maintaining protective fencing around stockpiles.

H. If the Contractor fails to perform topsoil salvaging, or if the quantity of topsoil salvaged does not equal the quantity of topsoil available for salvaging due to improper removal, storage or maintenance of stockpiles, import additional topsoil in quantities sufficient to meet the topsoil replacement requirements described in Section 02200, Earthwork. Imported topsoil shall be of natural, friable material possessing the characteristics of representative in situ materials.

3.06 GRUBBING

A. Remove wood or root matter below the ground surface remaining after clearing and stripping, including stumps, trunks, roots or root systems greater than one inch in diameter or thickness to a depth of 12 inches below the ground surface.

END OF SECTION
SECTION 02140 - DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION
A. This section includes materials, installation, maintenance, operation, and removal of temporary dewatering systems for the control and disposal of surface and ground waters.

1.02 RELATED WORK SPECIFIED ELSEWHERE
A. Section 02200  Earthwork
B. Section 02270  Temporary Erosion Control
C. Section 02310  Tunneling
D. Section 02315  Portal Area Development
E. Section 02655  Installation of Pipe

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS
A. California Regional Water Quality Control Board General Waste Discharge Requirements for Groundwater Remediation and Dewatering Waste Discharges, Order Numbers 95-25 and 96-41. Copies of the Waste Discharge Requirements may be obtained from the Water Authority.

1.04 JOB CONDITIONS
A. Methods of dewatering may include sump pumping, single or multiple stage well point systems, eductor and ejector type systems, deep wells, and combinations thereof.
B. Locate dewatering facilities where they shall not interfere with utilities and construction work to be performed by others.
C. Modify dewatering procedures which cause, or threaten to cause, damage to new or existing facilities, so as to prevent further damage. Install settlement gauges, as necessary, to monitor settlement of critical structures or facilities adjacent to areas of dewatering. Control the rate of dewatering to avoid all objectionable settlement and subsidence.
D. Comply with Regional Water Quality Control Board Waste Discharge requirements under Orders 96-41 and 95-25. Obtain authorization, as required, prior to discharge of groundwater, and comply with the sampling, testing, monitoring, and reporting requirements specified therein.

1.05 SUBMITTALS
A. Shop Drawings which, at a minimum, indicate the proposed type of dewatering system; the arrangement, location, and depths of systems components; a complete description of equipment and instrumentation to be used, with installation, operation and maintenance procedures; and the methods of disposal of pumped water.
B. Well installation or destruction permits.
PART 2 - MATERIALS

2.01 MATERIALS AND EQUIPMENT

A. Furnish and maintain all materials, tools, equipment, facilities, and services as required for providing the necessary dewatering work and facilities.

B. Provide piezometers for monitoring groundwater levels and other instruments and measuring devices as required.

PART 3 - EXECUTION

3.01 DEWATERING

A. Perform dewatering in accordance with approved Shop Drawings. Keep the Engineer advised of any changes made to accommodate field conditions and, on completion of the dewatering system installation, revise and resubmit Shop Drawings as necessary to indicate the installed configuration.

B. Organize dewatering operations to lower the groundwater level in excavations as required for prosecution of the work, and to provide a stable, dry subgrade for the prosecution of construction operations.

C. Maintain water level at lower elevations, so that no danger to structures can occur because of buildup of excessive hydrostatic pressure, and provide for maintaining the water level a minimum of two feet below the subgrade, unless otherwise permitted by the Engineer.

D. Maintain groundwater level a minimum of five feet below the prevailing level of backfill being placed.

E. Dispose of water in such a manner as to cause no injury or nuisance to public or private property, or be a menace to the public health. Dispose of the water in accordance with applicable regulatory agency requirements. Do not drain trench water through the pipeline under construction.

F. The dewatering operation will be continuous, so that the excavated areas shall be kept free from water during construction, while concrete is setting and achieves full strength, and until backfill has been placed to a sufficient height to anchor the work against possible flotation.

G. Prevent disposal of sediments from the soils to adjacent lands or waterways by employing necessary methods, including settling basins. Locate settling basins away from watercourses to prevent silt-bearing water from reaching the watercourse during flow regime.

H. Where excavations may obstruct the natural flow of a watercourse, implement measures to control and dispose of the surface water that will not adversely affect water quality or beneficial uses of the watercourse. Divert watercourse flows around excavation areas by constructing barriers, temporary culverts, new channels or other appropriate means.

I. Do not allow water containing mud, silt or other pollutants from aggregate washing or other construction activities to enter a watercourse or be placed in locations that may be subjected to high storm flows.

3.02 RECORDS

A. Provide a daily record of the average flow rate. Provide water quality testing as required by the Regional Water Quality Control Board.

B. Observe and record the elevation of the groundwater during the period that the dewatering system is in operation.

END OF SECTION
SECTION 02229 - BLASTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes the methods, limitations, and reporting requirements for the use of explosives and blasting conducted during excavation and tunneling operations.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200 Earthwork
B. Section 02310 Tunneling
C. Section 02315 Portal Area Development

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. California Code of Regulations, Title 8, Subchapter 20, Tunnel Safety Orders.
B. Occupational Safety and Health Administration Regulations (Standards-29 CFR) Standard 1926, Subpart U, Blasting and Use of Explosives.

1.04 SUBMITTALS

A. Copies of required blasting permits.
B. A two-part conceptual blasting plan prior to the start of drilling. Submit additional reports on blasting operations as specified herein. The conceptual blasting report shall be as follows:

1. Part 1 - General Plan: The General Plan shall include a complete summary of proposed methods for transporting, handling, storage, and use of explosives. The plan shall include a description of the experience record of the responsible blaster and copies of his California blasting license and his San Diego County Explosives Permit. The plan shall include the approval of the Chief of the San Diego County Fire Department and the Sheriff of San Diego County. The plan shall include copies of approved noise variances issued by local jurisdictions.

2. Part 2 - Site Specific Plan: The Site Specific Plan shall include the proposed general concept for trench excavation blasting, including controlled blasting techniques and control and monitoring of fly rock, airblast and ground vibration. Blasting intensities shall be limited as required to prevent damage to all existing structures, and in no case, shall intensities exceed the safety standard of particle velocity recommended by the U.S. Bureau of Mines. Provision shall be made for one or more test blasts. Samples of the proposed daily blasting report and the daily seismographic monitoring report shall be included in the plan submittal. The Site Specific Plan shall also contain samples of forms to be used for Blasting Notification (blasting notification includes notification to owner), Preblast Inspection, Blasting Complaint Form, Preblast Inspection Waiver Form, and Procedure for Handling Blasting-Related Complaints.

C. Seismic monitoring procedure.
D. Submit qualifications of the blasting consultant meeting the quality assurance requirements specified herein. Submit qualifications for the registered civil or geotechnical engineer, or a certified engineering geologist, or a State of California registered geophysicist; preblast inspector; seismic monitoring inspector; and blasting inspector.

General Conditions and Standard Specifications
1.05 QUALITY ASSURANCE

A. Retain the services of a qualified blasting consultant specialist to assist in the preparation of the required blasting plans and verification of reports. The blasting consultant's staff shall include:

1. A registered civil or geotechnical engineer or a certified engineering geologist or a State of California registered geophysicist with a minimum five years of recent experience in supervising the loading and firing of charges for rock slopes or tunnel excavations.

2. A qualified preblast inspector specializing in preblast surveys, with a minimum of five years experience in the field of preblast inspections.

3. A qualified seismic monitoring inspector specializing in the field of blast vibration monitoring, with a minimum of five years experience in the field of blast vibration monitoring.

4. A blasting inspector to observe all blasting operations, including the loading of drill holes for blasting, to verify that blasting operations are in conformance with approved plans. The minimum qualifications for the blasting inspector would be a State of California Blaster's License, Class B, recognition in the blasting field as an expert in drilling and blasting whose primary source of income is from providing specialized blasting and/or blasting consultant services.

B. The blasting consultant shall not be an employee of, nor be affiliated with, any explosives manufacturer, explosives distributor, or the Contractor. Should the Engineer determine during the course of the work, that the blasting consultant is not performing as required, retain the services of a different blasting consultant with qualifications satisfactory to the Engineer at no additional cost to the Water Authority.

C. The Engineer's review of the Contractor's blasting plans shall not relieve the Contractor of any of his responsibilities under the Contract for assuring the complete safety of his operation with respect to adjacent improvements and so as to not aggravate existing structural conditions or cause damage or for the successful completion of the work in conformity with the requirements of the Contract Documents. Blasting plan review shall not operate to waive any of the requirements of the Contract Documents nor relieve the Contractor of any regulation, permit obligation or condition therein. Graduation from an accredited four year college with a degree in engineering, geology, or equivalent, and demonstrated ten years recent blasting project experience in supervising the loading and firing of charges for rock slopes or tunnel excavations may be substituted for professional registration and/or certification at the discretion of the Engineer.

PART 2 - MATERIALS

2.01 MATERIALS AND EQUIPMENT

A. Furnish materials and equipment as required for blasting operations. Material usage, including transportation and storage, shall conform to all applicable regulatory agency requirements.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. No blasting shall be permitted which, in the Engineer's judgment, may be detrimental to existing installations, including the Water Authority's existing and under construction pipelines, structures, and all other related facilities.

B. Do not perform drilling or blasting work until the Contractor's plan for blasting operations has been submitted to and accepted by the Engineer. Limit blasting intensities as required to prevent damage to existing structures and utilities. Do not allow intensities to exceed the safety standards of particle velocity/frequency established by the U.S. Bureau of Mines (RI8507).

C. Prior to blasting, obtain the blasting permits/licenses required by City of San Diego, San Diego County, the State of California, and any other agency having jurisdiction. The San Diego County blasting ordinance and
local city ordinances typically contains several project-specific conditions which affect the cost of the work. Investigate these conditions during bid proposal preparation.

D. Conform to the requirements specified in the State of California Construction Safety Orders for the transporting, handling, storage, and use of explosives. Transportation of explosives shall be in accordance with the regulations of the State Fire Marshall and the California Highway Patrol. The locations, access and construction of explosive storage magazines shall be in accordance with the American Table of Distances for Storage of Explosives and approved by the Chief of San Diego County Fire Department and the Sheriff of San Diego County.

E. Blasting shall only be permitted between the hours of 8:00 a.m. and 4:00 p.m. during any weekday (Monday through Friday), unless special circumstances warrant another time or day, and special approval is granted in writing by the Engineer and the agency having jurisdiction. Submit any special approvals to the Engineer.

3.02 REPORTING AND NOTIFICATION

A. No blasting shall be permitted until the Contractor receives notification in writing from the Engineer that the blasting plans have been reviewed and until all preblast inspections and reports have been completed.

B. Provide a Blast Plan to the Engineer at least two work days prior to any proposed blast. The Blast Plan shall include explosives loading, distribution, delay periods, maximum pounds of explosives detonated per delay period, blast location, time of blast, distance to nearest improvement, identification of improvement and other blast parameters which are typically included for quality control and construction record purposes. The Blast Plan shall include a written plan describing the proposed seismic monitoring procedure, location, instrumentation, and testing agency. If two work days advance notice is not provided, blasting may be suspended by the Engineer.

C. Notify the Engineer at least two work days in advance of his intention to perform blasting within 400 feet of a residence or commercial building, including Water Authority facilities.

D. Provide a minimum of two working days advance notice in writing to all residences or businesses within 400 feet of the blast area. Provide two-work days notice to all utility agencies whose facilities may be influenced by the blasting operation. Provide the Engineer with a list of all people and agencies notified. Contact Underground Service Alert (USAERT/ DIGALERT) as required by State Law. Determine the blasting notification requirements of the owner and devise a procedure to provide the requested notifications.

E. Submit a blasting report within two-work days following a blast. Provide actual values of explosives loading, distribution, delay periods, maximum pounds of explosives detonated per delay period, blast location, time of blast, distance to nearest improvement, identification of improvements and other blast parameters which are typically included for quality control and construction record purposes. The blast report shall also include results from seismic monitoring performed by the Seismic Monitoring Expert. Seismic monitoring shall be conducted under the supervision of the blasting consultant. Seismic monitoring reports are to include identification of the instrumentation, monitoring location, frequency of the ground motion, peak particle velocity, displacement, airblast, recorded waveforms, date and time, and other relevant data. The blasting and seismic monitoring reports are to be in the format contained in the blasting plan. The blasting consultant shall verify the Contractor's blasting report and seismographic reports prior to submission to the Engineer.

3.03 INSPECTION REQUIREMENTS

A. Conduct preblast inspections of all residential, commercial, and Water Authority structures, and other improvements and facilities as necessary, within 400 feet of the blast area. Preblast inspections are to be conducted by the preblast inspector. Conduct the inspections a minimum of one week and no more than three weeks before blasting operations, unless otherwise approved by the Engineer due to special circumstances. A representative of the Contractor shall accompany the preblast inspector while conducting the inspections. The Contractor shall obtain the permission of the respective building owners prior to conducting the inspection. The Contractor shall arrange for inspection times. The results of the inspection
shall be reviewed by the blasting consultant in order to identify any structural conditions judged to be sensitive to blasting effects. The preblast inspection shall be for the purpose of determining the existence of any visible or reasonably recognizable pre-existing defects or damages in any structure and for quality control and construction record purposes. Visual inspection and photographic documentation methods shall be employed to ensure the validity of information obtained just prior to blasting operations.

B. Complete inspection reports of private property identifying all findings shall be signed by the Contractor, blasting consultant, preblast inspector, and the property owner/occupant. Upon completion of all blasting, the Contractor shall forward all preblast inspection reports and photographs to the Engineer. The inspection reports shall be either typed or recorded on standard 90 minute or microcassette tape.

C. File with the Engineer a summary report of all private property inspections identifying address, occupant/owner's name, time and date of inspections, and any inspection waiver signed by the property owner with an explanation as to why an inspection of a specific structure was not made. This summary and waiver report shall be signed by the Contractor, preblast inspector, and blasting consultant and delivered to the Engineer prior to blasting.

D. Conduct post-blast inspections upon receipt of a written or verbal request or complaint of damage to property, structure, or other improvement from the respective owners. Perform such inspections and provide a written report to the Engineer within 30 calendar days of receipt of the request or complaint.

3.04 BLASTING

A. Drilling and blasting patterns, delay distribution and, explosive types and quantities, shall be at the Contractor's option; provided the ground motion frequency and airblast limitations, as specified herein, are met with respect to pounds of explosive detonated per delay period; and provided further that non-nitroglycerin explosive types are used in wet ground conditions. Use only non-electric explosives detonators.

B. Perform blasting with skilled workers and under the direction of a State of California and San Diego County licensed blasting foreman. Perform blasting only when proper precautions have been taken for the protection of people, private property, and existing structures. Injury to people, or damage to private property, or existing structures is the responsibility of the Contractor.

C. As production blasting operations progress, evaluate the drilling and blasting procedures based on the results achieved. If a drilling and blasting program yields unsatisfactory results with regard to excessive blasting effects, the Contractor and Blasting Consultant shall be required to devise and employ methods which shall improve results. The revision may include special methods such as, but not limited to, different delay patterns, adjustment in size of individual blasts, adjustment in diameter of blast holes, closer spacing of blast holes, reduction of the explosives quantity detonated per delay period, or improved stemming procedures, as necessary, to improve results.

D. Conduct controlled blasting in a manner which produces relatively smooth and sound rock faces at the final excavation lines and maintain blasting effects within the prescribed limits. The type, distribution and quantity of explosive detonated per delay period shall be such that existing rock fractures shall neither be opened nor new fractures created outside of the minimum excavation limits. Whenever, in the opinion of the Engineer, further blasting is liable to reduce rock stability or damage pipelines or other structures, cease blasting and continue to excavate the rock by approved mechanical or chemical means. Excessive blasting or "overshooting" shall not be permitted. Fly rock shall be contained within the project rights of way and shall not represent a hazard to people, vehicles, existing improvements or vegetation. Use blasting mats to prevent possible flyrock damage. At the end of each working day, clean the blasting site of all debris associated with the blasting operation. Remove and replace with acceptable material any material outside the authorized cross section which may be shattered or loosened by blasting.

E. Do not permit blasting within 15 feet of an existing pipeline or structure without submission of a site-specific blasting plan to the Engineer and written approval of the plan by the agency having jurisdiction. Do not conduct blasting within 100 feet of concrete which has been placed less than seven calendar days.
3.05 MONITORING REQUIREMENTS AND BLASTING LIMITATIONS

A. Perform seismographic monitoring of all blasting. A seismograph shall be placed at the nearest structure to the blast area to monitor the ground motion particle velocity and frequency during each blast. When blasting adjacent to existing Water Authority pipelines an additional seismograph will be placed over the pipeline at a point closest to the blast area.

B. The maximum particle velocity at the nearest point to the Water Authority pipelines from the blast area shall be six inches per second at a minimum frequency of 10 hertz. In the event either of these limitations are exceeded, the Contractor will perform excavations to determine the extent of possible damage to the pipelines. Perform repair work as necessary and backfill all excavations. The excavation, repair and backfilling will be the sole responsibility of the Contractor whether damage has or has not been incurred.

C. The maximum peak particle velocity at the nearest residential or commercial structure shall be as follows:

<table>
<thead>
<tr>
<th>Frequency (hertz)</th>
<th>Maximum Peak Particle Velocity (inch per second)</th>
</tr>
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<tbody>
<tr>
<td>2.5 to 10</td>
<td>0.5</td>
</tr>
<tr>
<td>11 to 40</td>
<td>0.05 x frequency*</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>2.0</td>
</tr>
</tbody>
</table>

* The maximum allowable peak particle velocity is the product of 0.05 multiplied by the seismogram frequency (e.g., assuming the frequency is 30 Hz, the maximum allowable peak particle velocity is 30 times 0.05 or 1.5 inches per second).

D. Airblast at the nearest residential or commercial building shall not exceed 129 Db-Linear at six hertz high pass system.

3.06 SUSPENSION OF BLASTING

A. Blasting operations may be suspended by the Engineer for any one or more of the following:

1. Safety precautions are inadequate;
2. Ground motion vibration levels exceed specified particle velocity/frequency limits as specified herein;
3. New or further damage to existing structures or improvements as a result of blasting;
4. Blasting methods which in the opinion of the Engineer endanger the stability of intact rock outside of the prescribed limits of excavation;
5. Skilled operators and/or the licensed blasting supervisor is not present;
6. Failure to comply with blasting notification requirements; or
7. Fly rock travels beyond the project right-of-way or strikes overhead lines.

B. Suspension of blasting operations shall not relieve the Contractor of his responsibilities under the terms of the Contract Documents. Do not resume blasting operations until modifications have been made to correct the conditions that resulted in the suspension. The Contractor shall not be entitled to any extension in time, nor to any claim of damage or to excess costs, by reason of any blasting suspension order.

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes the furnishing, installation, and maintenance of temporary erosion and sedimentation controls for all earthwork, trenching, clearing and grubbing operations.

B. For projects with soil disturbances of one acre or more, comply with the National Pollution Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, General Permit No. CAS000002 and requirements included herein.

C. For projects with soil disturbances under one acre, erosion and sedimentation control measures shall comply with requirements provided herein, local jurisdictional agency requirements, and applicable requirements in local storm water management programs developed to comply with NPDES permits issued by the Regional Water Quality Control Board.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02110 Clearing and Grubbing

B. Section 02140 Dewatering

C. Section 02200 Earthwork

D. Section 02315 Portal Area Development

E. Section 02510 Access Roads

F. Section 02940 Revegetation

1.03 SUBMITTALS

A. Six copies of a SWPPP prior to commencement of construction in conformance to the requirements for the General Permit. A copy of the General Permit may be obtained from the Water Authority. The SWPPP shall address both storm water and non-storm water discharges.

B. Manufacturers catalog data and samples on materials used for erosion control, including the physical characteristics, application and installation instructions.

C. NOTICE OF INTENT: Submit a Notice of Intent and pay filing fee prior to commencement of construction activities covered by the NPDES General Permit to:

State Water Resources Control Board
Division of Water Quality
Storm Water Permit Unit
P.O. Box 1977
Sacramento, CA 95812

D. NOTICE OF TERMINATION: When construction is complete, submit a Notice of Termination certifying that state and local requirements have been met in accordance the General Permit to:

San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123
E. RECORDS RETENTION: Retain records of monitoring information, copies of all reports required by the NPDES General Permit, and records of data used to complete the NOI for construction activities covered by the General Permit for at least three years from the date generated. This period may be extended by request from the State Water Resources Control Board and/or San Diego Regional Water Quality Control Board.

F. NONCOMPLIANCE REPORTING: Report instances of noncompliance with the SWPPP to the RWQCB.

PART 2 - MATERIALS

2.01 MATERIALS

A. Provide sand bags, silt fences, straw bales and other materials to control erosion and sedimentation as shown on the SWPPP and Shop Drawings.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Construct and implement erosion control measures in accordance with the SWPPP and as described herein.

B. Grade disturbed surfaces to provide positive drainage and prevent ponding of water. Surface water shall be controlled to prevent water damage or deposition of sediment to all adjoining and downstream properties.

C. Install silt fences, sedimentation ponds, sandbag dikes, stabilized construction entrances and any other erosion control measure to minimize sediment escape from the construction site and to maintain runoff quality in compliance with the General Permit. Prevent construction sediment from entering any streams, ponds or drainage facilities.

D. At a minimum, provide erosion and sedimentation control measures immediately following clearing and grubbing operations in the following locations:

1. In pipeline rights of way immediately upstream of all natural channels.

2. At the lowest end of areas disturbed by construction before runoff from storms can reach natural streams.

3. At additional locations as required to control sedimentation as required by the SWPPP.

E. Erosion and sedimentation control measures shall remain in place until such time that the site of work is prepared for permanent drainage and erosion control measures. Remove temporary erosion and sediment control measures so as not to interfere with permanent drainage, erosion control and revegetation.

3.02 MAINTENANCE

A. Conduct site inspections of the erosion and sedimentation control measures prior to forecasted storm events and after the actual storm to evaluate the adequacy and effectiveness of such measures. Make and implement modifications as necessary to comply with the General Permit. Submit inspection reports to the Engineer after each storm event. Include in the inspection reports at a minimum, the date of the inspection, the individual(s) who performed the inspection, the observations, and any modifications implemented.

B. Maintain sedimentation and erosion control measures, ensuring proper operation before, during, and after storm events.
C. Repair all damaged erosion and sedimentation controls. Reinstall to finished condition any erosion damage within the construction area for the duration of the Contract.

D. In accordance with the General Permit, annually certify that the construction activity is in compliance with the requirements of the SWPPP. The certification shall be based upon the site inspections required above. The written certification shall be submitted to the Engineer by each July 1. Immediately notify the Engineer in writing if it is determined, during the annual certification that the construction activity is not or has not been in compliance with any of the General Permit and SWPPP requirements. The notification shall identify the type of noncompliance and include a time schedule when compliance will be achieved.

E. Additional site inspections and/or sampling and analysis may be required at the request of the California Regional Water Quality Control Board, San Diego Region, or the Engineer.

3.03 REMOVAL

A. Remove and dispose of materials used for temporary sedimentation and erosion control measures offsite when permanent erosion control facilities are completed and accepted by the Engineer.

END OF SECTION
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SECTION 02940 - REVEGETATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes materials and services required to revegetate areas disturbed by construction activities, and other areas to be revegetated as shown on the Plans. Revegetation includes, but is not limited to, application of seed mixes, planting of container plants and cuttings, straw mulching, establishment of plant materials, weed control and maintenance of seeded and planted areas for a two-year period following the date of filing of the Notice of Completion.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02110 Clearing and Grubbing
B. Section 02200 Earthwork
C. Section 02315 Portal Area Development
D. Section 02830 Fencing

1.03 DEFINITIONS


1.04 SUBMITTALS

A. List of plant materials and seeds to be provided, with quantities of each and sources indicated, no later than 60 days after Notice to Proceed. Indicate that the materials specified will be available at anticipated installation date, or are to be contract grown.

B. Delivery certificates for container plant materials stating source, quantity, type of material (container size, genus and species), and that plant materials conform to the specifications. Certificates shall be submitted prior to approval to begin planting.

C. Seed bag certification tags and a signed certificate listing the quantity and type of seed. Tags shall include seed type (genus and species), quantity (weight), analysis, name of supplier, seed purity percentage, seed germination percentage, weed seed content, and date seed was tested.

D. Source, supplier's and manufacturer's literature for bulk material samples, and samples of up to half a pound of mulch and soil stabilizers.

E. Furnish bulk material delivery certificates of each delivery stating source, quantity, type of material, and that material conforms to specifications. For mulch and binders in containers, furnish a certificate stating total quantity by weight and volume for each material.

F. Provide a schedule of revegetation work consistent with regulatory permits and requirements herein, prior to commencement of revegetation work.

G. Samples of two ounces of each individual species' seed, drawn at the time of each seed delivery to site.

H. Three samples of plant materials and cuttings for each variety and size specified delivered to the site a minimum of three days prior to planting operations. Approved samples shall be inspected by the Engineer for conformity to the requirements herein and shall remain on the site and shall be maintained by the...
Contractor as standards of comparison for plant materials to be furnished. Upon acceptance of plant materials, approved samples shall be tagged and incorporated into the work.

I. Reports on the status of revegetation activities. Status reports shall be submitted with the Contractor’s daily reports.

J. Qualifications of revegetation specialists.

1.05 QUALITY ASSURANCE

A. Contractor qualifications: Perform work in accordance with best standards of practice under continuous supervision of a qualified, experienced revegetation specialists capable of interpreting the specifications and distinguishing the various vegetation types encountered in execution of the work.

B. The Contractor or subcontractor performing revegetation shall posses valid California Contractor License, Class C-27.

C. Nursery qualifications: All plant nurseries providing materials shall posses a valid California Nursery License and shall show proof of growing the type of specified plants a minimum of five years. Plant and seed materials shall meet applicable inspections required by law.

D. Review and conform to all permits, and regulatory requirements applicable to revegetation of this project, as issued by the California Department of Fish and Game, United States Fish and Wildlife Service, Army Corps of Engineers, Regional Water Quality Control Board and any of the federal, state or local regulatory agency. Copies of permits will be provided to the Contractor by the Engineer.

E. The type and amount of herbicides shall be prescribed by a licensed pest control advisor. Herbicides shall be in accordance with the manufacturer’s product label and all applicable regulations. Do not use pre-emergent herbicides.

1.06 REJECTION AND SUBSTITUTION

A. Plants, seeds, and other revegetation materials not conforming to the requirements specified herein shall be considered defective, and such materials, whether in place or not, shall be marked as rejected, removed from the site, and replaced with acceptable materials. The Engineer may reject entire lot of plants represented by defective samples.

B. Make no substitutions from specified plant, seed, or other specified revegetation materials without written approval of the Engineer. All requests for substitute plant and seed materials shall be submitted to the Engineer a minimum of 30 days prior to the scheduled seed application or planting date.

1.07 SEQUENCING AND SITE CONDITIONS

A. Prior to the start of work, examine site conditions, and locate all environmentally sensitive areas, and other features, so that precautions may be taken not to damage such areas. In the event of conflicts between environmentally sensitive areas and the work of this section, promptly notify the Engineer. Provide for the protection of environmentally sensitive species and habitats within and adjacent to the work areas at all times.

B. With the exception of surveying and collection of seeds or plant cuttings, no construction or other disruptive activities (including soil testing or other form of surface disturbance) may occur in or adjacent to environmentally sensitive areas without prior written approval from the Engineer.

C. Planting and seeding shall not start in any area prior to inspection and approval of site preparation work, which includes topsoil replacement, weed control and soil preparation.

D. Install container plants and cuttings, where shown, prior to seeding.
1.08 SITE OBSERVATION VISITS

A. Schedule site observation visits with the Engineer prior to the start of each of the activities listed below. Provide a minimum of two and not more than ten working days advance notice for each day in which the following activities will occur.

1. Commencement of work for verification of existing conditions and locations of environmentally sensitive areas.

2. Topsoil salvaging for review of salvage and stockpile procedures.

3. Completion of backfilling and grading.

4. Replacement of salvaged topsoil and soil preparation.

5. Delivery of plant materials and when the plants and cuttings are spotted in place for planting, but prior to excavation of planting holes.


7. Seeding and straw mulching operations.

8. Plant watering.

B. The cost to the Water Authority associated with any testing, sampling and inspection scheduled by the Engineer on account of the advance notice provided by the Contractor that is delayed or prevented from occurring on the scheduled day due to insufficient progress or other fault of the Contractor, shall be backcharged to the Contractor and deducted from future partial or final payments.

PART 2 - PRODUCTS

2.01 FIBER MULCH

A. Provide fiber mulch consisting of a green-dyed virgin wood cellulose fiber mulch containing no germination or growth inhibiting factors. Suppliers shall certify that their products meet all specified requirements based on laboratory and field testing. Weight specifications of this material shall refer to air dry weight of fiber material. Absolute air dry weight is based on normal standards of Technical Association of Pulp and Paper Industry for wood cellulose and is considered equivalent to 10 percent moisture. Each package of cellulose fiber shall be marked by manufacturer to show air dry weight content.

2.02 SEED MATERIALS

A. A general seed mix shall consist of the following:

<table>
<thead>
<tr>
<th>Species/Common Name</th>
<th>Min. % Purity</th>
<th>Min. % Germination</th>
<th>lb. per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plantago insularis/Plantain</td>
<td>98</td>
<td>75</td>
<td>25.0</td>
</tr>
<tr>
<td>Lotus scoparius/Deerweed</td>
<td>90</td>
<td>60</td>
<td>5.0</td>
</tr>
<tr>
<td>Lupinus succulentus/Arroyo Lupine</td>
<td>98</td>
<td>85</td>
<td>2.0</td>
</tr>
<tr>
<td>Lasthenia chrysostoma/Goldfield</td>
<td>50</td>
<td>60</td>
<td>1.0</td>
</tr>
<tr>
<td>Phacelia ramosissima/Phacelia</td>
<td>95</td>
<td>85</td>
<td>1.0</td>
</tr>
</tbody>
</table>

B. Seed not required to be labeled under the California Food and Agriculture Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts, or a seed
technologists certified by the Society of Commercial Seed Technologists. Seed shall have been tested for purity and germination not more than one year prior to application of seed.

C. Deliver to the jobsite seeds for each plant species in separate, scaled containers. Perform proportioning by weight and mixing of seed mixes in the field in the presence of the Engineer immediately prior to application.

2.03 SOIL STABILIZER

A. Soil stabilizer will be a 100 percent organic tackifier, supplied in powder form and comprised of at least 83 percent pure mucinoid derived from organic sources. Tackifier will be water soluble, non-toxic, hydrophilic and will not inhibit germination. Acceptable products include "M-Binder," or equal.

2.04 STRAW MULCH

A. Provide certified clean, weed free rice straw.

2.05 STRAW WATTLES

A. Straw wattles shall be manufactured from rice straw and be wrapped in a tubular plastic netting. The netting shall have a strand thickness of 0.30 inch, a knot thickness of 0.55 inch and a weight of 0.35 oz/ft, and shall be made from 85 percent high density polyethylene, 14 percent ethyl vinyl acetate, and 1 percent color for UV protection. Straw wattles shall be nine inches in diameter, 25 feet long and weight approximately 30 pounds.

B. Wood stakes for anchoring straw wattles shall be 3/4-inch-square and 24 inches long.

2.06 PLANT MATERIALS

A. Plant materials shall consist of container-grown plants as described herein. Provide container plants in accordance with the planting schedule shown on the Plans.

B. Provide plant materials typical for variety and species, sound, healthy, vigorous, and free from plant disease, insect pests or eggs. Provide plants with healthy, normal root systems. Do not prune plants or trees prior to delivery.

C. Provide container plants which have been grown in containers for a period of time sufficient to develop root growth to hold soil ball together to side and bottom of container in which it was delivered, but not to the point of being root bound.

D. Do not grow container plants with stakes, nor prune into unnatural forms. Only plants with natural shapes and growth forms will be accepted.

2.07 CUTTINGS

A. Provide cuttings which originate from the same watershed in which they are to be planted. Collect cuttings during the plant dormancy (leafless) period of December 15 to February 15, or as determined by the Engineer.

B. Cuttings shall be 24 inches in length and between 1/2 inch and one-inch in diameter. Cut the base of each cutting at a 45-degree angle to distinguish the planting end from the growing top.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE AND HANDLING

A. Deliver seed in unopened supplier's sealed containers bearing original certification labels. Label seed according to state and federal laws.
B. Keep seed materials, during delivery and when temporarily stored on site, in a cool dry place, protected from moisture, wind, heat, vandalism, rodents, insects, weather and other conditions that would damage or impair viability of seed.

C. Keep container plants and cuttings, during delivery and when temporarily stored on site, in a cool place, protected from wind, heat, vandalism, rodents, insects, weather, desiccation and other conditions that would damage plants. Care shall be taken in handling plants to prevent damage to stems and trunks.

D. Water container plants to maintain soil moisture and to prevent desiccation or damage to root ball or leaves.

E. Store container plants and seed materials on site for no longer than two weeks.

F. The Engineer may reject any plant material damaged due to mishandling.

3.02 VERIFICATION OF SITE CONDITIONS

A. Locations of plant materials as shown on the Plans are approximate only. Before proceeding with any work, verify all dimensions and quantities and inform the Engineer of discrepancies between contract documents and actual conditions. Do not perform work in any area where a discrepancy exists.

3.03 WEATHER

A. Perform planting and seeding during periods when weather and soil conditions are normal for season and suitable in accordance with locally accepted horticultural practice. Apply hydroseeding and straw mulching only when winds are calm. Do not apply hydroseeding during rainy weather or when the soil temperature is below 40 degrees F.

3.04 SOIL PREPARATION

A. Mechanically scarify (rip) the soil surface to roughen and alleviate compaction prior to seeding. Thoroughly scarify areas to be planted and seeded with ripper blades spaced 12 inches apart to a depth of 12 inches.

B. Leave soil surface in acceptable condition, suitable for seeding, installation of container-grown plants or cuttings.

C. Verify adequacy of soil preparation in revegetation areas with the Engineer prior to initiating seeding and planting operations.

3.05 EROSION CONTROL

A. Continuously control erosion as specified herein and in accordance with measures shown on the Plans or the SWPPP. Erosion control measures shall be implemented and maintained throughout the warranty period. Remove temporary erosion control measures that will not be a part of the permanent erosion control plan.

B. Immediately notify the Engineer of any situation requiring additional erosion control devices to prevent soil erosion or sedimentation into any area beyond the project limits.

C. Monitor for erosion within revegetation areas and provide measures to prevent gullies, rill and sheet erosion, and silt deposition from occurring. Erosion control shall emphasize prevention. Repair erosion as required and include redirection or dissipation of the water source and recontouring of soil, followed by seeding, mulching, or planting. Strategically placed and secured straw wattles, hay bales or sandbags may be used to dissipate water sources.

D. Use methods and materials for re-hydroseeding, or planting of eroded areas consistent with the requirements herein. Do not use invasive exotic species for erosion control.
CONTAINER PLANTING

A. Spot planting locations for container plants in place prior to planting. Relative position of all plants is subject to approval by the Engineer.

B. Prior to installing plants, build moisture reserve in soil by twice filling excavated plant holes with water and allowing to drain naturally.

C. Set plants in center of plant hole, in vertical position, so that after allowing for watering and settling, the crown of root ball is 1 inch above surrounding finish grade.

D. Backfill around plant root balls with native topsoils from the site, excluding rock greater than two inches. Do not use muddy soil. Backfill by gently tamping down soil to remove air pockets. Do not fill around trunks or stems. Cut off all broken or frayed roots.

E. Do not allow plants to dry out before or while being planted. Keep exposed roots moist at all times during planting operations. Do not expose roots to air except while being placed in ground.

F. Remove and replace any plants not properly handled, spotted or planted.

G. Upon delivery, plant root systems shall be inspected by the Engineer to ensure that roots are both straight and well established. Plants with coiled roots will be rejects.

H. Construct raised earthen berms around each container plant installed to create water basins. Construct basins approximately four-feet in diameter, with berms three inches high.

I. Water each plant immediately after planting. Backfill any voids or settlement with additional topsoil. Allow topsoil surface to naturally drain, then repeat the watering.

CUTTINGS

A. Collect cuttings no earlier than 24 hours prior to planting. Place cuttings out of direct sunlight in a cooler maintained at a temperature between 35 degrees and 45 degrees F. Do not, at any time, expose cuttings to dry conditions for more than 10 minutes prior to planting and watering.

B. Spot locations for cuttings prior to planting. Relative position of all cuttings is subject to approval by the Engineer.

C. Plant cuttings after topsoil replacement operations are complete. Plant cuttings so that 2/3 of the cutting length is placed below ground. Space cuttings every four feet on-center.

D. Remove and replace any cuttings not properly handled, spotted or planted.

E. Water each cutting immediately after planting. Backfill any voids or settlement with additional topsoil. Allow topsoil surface to naturally drain, then repeat the watering.

HYDROSEEDING

A. Hydroseeding shall consist of a slurry mix of seed, soil stabilizer, fiber mulch, water and other approved additives. The mix shall include 2000 lb/acre of fiber mulch, 100 lb/acre of soil stabilizer, seed materials as specified and water as required to prepare a mix that shall become uniformly suspended to form a homogeneous slurry, that when hydraulically sprayed on the ground, will form a blotter-like ground cover impregnated uniformly with seeds and which, after application, will allow absorption of moisture and rainfall to percolate to underlying soil.

B. Use hydraulic hydroseeding equipment, with a built-in agitation system and sufficient operating capacity to continuously agitate, suspend and homogeneously mix the slurry. Use distribution lines of sufficient size to prevent stoppage and provide even distribution of slurry. Use traveling unit hydroseed equipment capable
of placing slurry tank and spray nozzles within sufficient proximity of areas to be hydoseeded so as to provide uniform distribution without waste. Limit the operation of hydraulic hydoseeding equipment to access roads to prevent soil compaction or damage to seeded areas. Provide extension hoses, as necessary, to reach all areas to be hydoseeded. Damage to prepared ground surface resulting from hydoseed application shall be repaired and reseeded at the direction of the Engineer.

C. Apply hydoseed within 30 days after topsoil replacement operations are complete. Perform topsoil replacement coincident with backfilling operations.

D. Mix hydoseed slurry immediately prior to hydoseed application. Do not allow slurry to remain in the tank for more than one hour before application.

E. Apply the slurry in a one step application. Using the wood fiber as a guide, spray soil with uniform visible coat of slurry in sweeping motion, allowing wood fibers to build upon each other, until complete, even coverage is achieved.

F. Apply hydoseed to all areas disturbed during construction, with the exception of permanent access roads, structures, or other areas designated for other revegetation as shown on the Plans. Designated slope areas are subject to approval by the Engineer.

3.09 IMPRINT SEEDING

A. Use imprint seeding methods only in areas designated on the Plans. Imprint seed to areas disturbed during construction, with the exception of permanent access roads, structures, or other areas designated for other revegetation as shown on the Plans. Use imprint seeding after topsoil replacement operations are complete. Perform topsoil replacement coincident with backfilling operations.

B. Imprint seeding equipment shall consist of a heavy weighted roller with minimum core diameter of 20 inches, and a length of eight feet or less. The roller shall form discontinuous, v-shaped troughs on the soil surface that produce corresponding soil imprint patterns when towed. The imprint roller shall have teeth between four inches and 10 inches in height. Teeth shall be v-shaped in transverse section and rectangular or triangular in longitudinal section. Crest to crest spacing between teeth shall be one foot or less and the angle between front and rear faces of imprinting teeth shall be 60 degrees or less. The imprint roller shall provide a minimum static pressure on the soil surface between 10 psi and 50 psi. Provide a minimum of one imprint pattern per every square foot of area imprinted. The imprint shall cover a minimum of 70 percent of the area imprinted.

C. Attach a calibrated seed bin on top or directly in front of the imprinting roller to distribute seed mixes. Thoroughly clean the seed bin prior to use. Do not allow residual seeds remaining from previous uses in the seed bin.

D. Mix seed with wheat bran or approved substitute to aid in calibrating seed application rate and to prevent seed segregation. Determine the mixing ratio in the presence of the Engineer at the seeding site immediately prior to commencing with imprint seeding. Do not allow seed and bran mixture to remain in seed bin for more than four hours.

E. Seed bin shall drop seeds onto or directly in front of imprinting roller during application. Rollers shall immediately firm seeds into contact with soil.

3.10 STRAW MULCHING

A. Apply straw mulching on all slopes 2:1 or steeper, and as designated on the Plans, promptly after topsoil replacement operations are complete. Apply straw mulching in a four-step operation as follows:

1. Hydoseed areas with the specified seed mix, except that the quantity of fiber mulch in the mix shall be reduced to 1700 lb/acre and the soil stabilizer shall be removed.
2. Uniformly apply straw at a minimum rate of 4000 lb/acre. When weather conditions are suitable, straw may be pneumatically applied by equipment that will not render the straw unsuitable for incorporation into the soil. Use hand spreading or other means where pneumatic equipment is unable to reach the limits for straw mulching.

3. Roll straw into soil surface with studded steel plate straw roller equipment capable of forcing straw into the soil to a sufficient depth to tie down the surface soils. Steel plate studs shall be at least six inches wide, and approximately one inch thick, with rounded edges.

4. Apply a fiber mulch mix consisting of 300 lb/acre fiber mulch and 100 lb/acre soil stabilizer over the rolled straw.

3.11 STRAW WATTLEs

A. Install straw wattles, where shown on the Plans, on slopes with minimum spacing as follows:

<table>
<thead>
<tr>
<th>Gradient</th>
<th>Measured Slope Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1 or steeper</td>
<td>20 feet apart</td>
</tr>
<tr>
<td>1:1 to 2:1</td>
<td>30 feet apart</td>
</tr>
<tr>
<td>2:1 to 3:1</td>
<td>50 feet apart</td>
</tr>
</tbody>
</table>

B. Install straw wattles across the full width of the restored area level to the slope contour, in three-inch deep trenches. Anchor straw wattles with wood stakes at four-foot intervals, with additional stakes at each end. Tightly abut the ends of adjacent straw wattles to each other. Do not overlap ends.

3.12 CLEAN UP

A. Keep all work areas clean, neat and orderly at all times.

B. Upon completion of revegetation work, remove rubbish, trash, and debris resulting from the revegetation operations.

C. Remove oversprayed hydroseeding and straw from walks, lights, access roads, streets, fences, structures, etc.

D. Remove any detrimental, non-native plants growing in the work area not specified in the seed mix.

3.13 ESTABLISHMENT MAINTENANCE

A. The establishment maintenance period will begin on the first day following completion and acceptance of the revegetation work. Continue the establishment maintenance activities for a period of two years following the date of filing of the Notice of Completion (i.e., the contract warranty period), and as specified herein.

B. Maintain all container plants and cuttings in a vigorous, thriving condition by proper watering, weed control, clean up, general care, and any other means necessary.

C. Provide water, as necessary, to plantings during the establishment period. Determine watering frequency by checking soil moisture levels to prevent wilting or other damage to plant materials.

D. Apply water in a manner that ensures deep penetration into the soils surrounding the plant root balls. Fill plant basins until the soil around the roots is moist from the bottom of the hole to the top of the ground. Filling the plant basins several times per watering event may be required.

E. Inspect and repair plant basins as needed prior to each watering.
F. Perform weed control as specified herein, or as directed by the Engineer.

G. Make inspections at a minimum of every three months to ensure plant materials are healthy and free of insect infestations and plant diseases. Report any findings to the Engineer. Remove diseased plants and replace them to prevent the spread of diseases and insects.

H. Monitor plant materials for damage caused by animals, and inform the Engineer of such damage. Propose remedial actions to the Engineer for approval. Provide remedial actions, such as fencing.

I. Remove and dispose of, all trash and litter accumulated during the establishment maintenance period.

J. At no time apply fertilizers, pesticides, or herbicides other than those specified to any of the planted or hydroseeded areas without the written approval of the Engineer. Biological control agents, such as insect predators, may be used with the approval of the Engineer.

K. During the establishment maintenance period, replace in like kind and size to the same specifications required for original planting all plants which die, are unhealthy, or diseased. All replacement planting shall be performed within 30 days receipt of written notice provided by the Engineer.

3.14 WEED CONTROL

A. Control noxious and annual weeds in all areas to be planted and hydroseeded during construction and throughout the establishment maintenance period. Within 10 days prior to initiating seeding and planting operations, perform weed eradication. Noxious and annual weeds are identified as follows:

1. Noxious weeds are perennial weeds that pose a threat to establishment of revegetation areas and resprout from underground roots. A general list of noxious weeds targeted for control include: Artichoke thistle (Cynara cardunculus), Fennel (Foeniculum vulgare), Castor bean (Ricinus communis), Tree tobacco (Nicotiana glauca), Pampas grass (Cortaderia spp.), Bermuda grass (Cynodon dactylon), Tamarisk (Tamarix spp.), Eucalyptus (Eucalyptus spp.), Acacia (Acacia spp.), Hottentot fig (Carpobrotus spp.) palms (Phoenix spp. and Washingtonia spp.), Gazania (Gazania spp.), and Giant reed (Arundo donax).

2. Annual weeds are those that pose a threat to establishment of revegetation areas due to vigorous, competitive growth habits. A general list of annual weeds targeted for control include tall annual grasses of various species, Mustard (Brassica spp.), Russian thistle (Salsola australis), Medic (Medicago spp.), Sweet-Clover (Melilotus spp.), Wild radish (Raphanus spp.), Tocalote (Centaurea melitensis), Garland chrysanthemeum (Chrysanthemum coronarium), and Cocklebur (Xanthium spinosum and X. strumarium).

3. Other weeds may be identified for control by the Engineer during the establishment maintenance period.

B. All areas shall be weeded prior to the weeds reaching 12 inches in height or before ripening of seed.

C. Employ weed control methods as follows:

1. Train personnel to be knowledgeable in the identification of weed species and desirable seeded and planted species to ensure only the spraying and removal of weed species.

2. Control noxious weeds and their root systems by cutting top growth off and spot spraying the stumps with an approved herbicide that will translocate to the roots. Top growth, seed heads and plant mass shall be removed from the site.

3. Control annual weeds by either pulling out by hand or hoeing. The stems of the hoed plants will be cut below ground level. Weed plant mass shall be removed from the site.

D. Leaf and branch drop, and other organic debris of species not identified as weeds may be left in place.
3.15 PERFORMANCE STANDARDS DURING PLANT ESTABLISHMENT PERIOD

A. At six-month intervals following the completion of planting, or at other intervals as directed by the Engineer, inspect the container plants in the presence of the Engineer and determine the plant survival rate. At each inspection, should the mortality rate of any individual species exceed 10 percent of the original number of that species, or should the mortality rate of the total planting exceed 10 percent of the total original number of container plants, or at the completion of the warranty period should the plant mortality rate of any individual species exceed 20 percent of the original number, or should the mortality rate of the total planting exceed 20 percent of the total original number of container plants, plant additional container plants of like kind and to original numbers and size as specified herein for the original planting. Warranty replacement plants for the duration of the warranty period, but in no case for less than eight months.

END OF SECTION