TECHNICAL SPECIFICATIONS

for

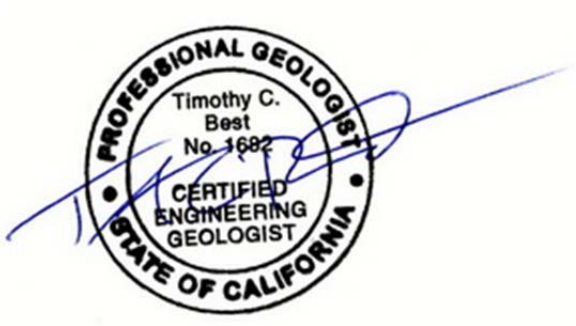
DARK GULCH CROSSING STABILIZATION PROJECT

Prepared for:

SAN MATEO COUNTY
RESOURCE CONSERVATION DISTRICT

100% SUBMITTAL

January 16, 2020



DARK GULCH CROSSING STABILIZATION PROJECT
TECHNICAL SPECIFICATIONS
95% SUBMITTAL

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SUMMARY OF WORK

SECTION 011100
SUMMARY OF WORK

1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Conditions, Supplementary Conditions (if any), and all Specification Sections apply to this Section.

1.2 PROJECT DESCRIPTION

A. DARK GULCH CROSSING

1. The Dark Gulch crossing is an actively failing crib log crossing located on the Old Haul Road within Pescadero Creek, County Park, San Mateo County, CA. The crossing consists of over 37,000 cubic yards (cy) of fill that is partially supported by decaying crib logs. These crib logs which form the foundation and internal reinforcement of this crossing are collapsing, compromising safe usage of the roadway, and resulting in large volumes of sediment delivering to the stream network. If left untreated, the rate of erosion and the instability of the crossing are likely to increase as the logs decay further, and erosion undermines the embankments.
2. The Project proposes to reconstruct and stabilize the Dark Gulch crossing by excavating the unstable and actively failing fill material and accompanying embedded crib logs, installing a new 66 inch diameter by 240 foot long culvert large diameter culvert with a rock energy dissipator at the culvert outfall, reconstructing the road prism on new engineered fill, and the placement of excess excavated material onsite as non-structural fill. Additional improvements to road drainage are also proposed along Old Haul Road
3. The Work to be performed by the CONTRACTOR consists of providing all labor, services, tools, machinery, equipment, and materials necessary to complete the project as outlined in the drawings. The Work includes, but is not limited to the following items:
   a) Site preparation including:
      i) Construction staking/surveying.
      ii) Installation of temporary erosion and sediment control devices.
      iii) Installation of temporary fencing
      iv) Site dewatering
   b) Clearing, grubbing and stripping.
   c) Site excavation including:
      i) Excavation of unstable fill and soils to native channel grade
      ii) Separation and stockpiling of select soils to be used as engineered fill from excess and deterious soils to be placed as compacted non-structural fill
      iii) Removal of old crib logs and other debris to approved location
   d) Installation of 66 inch diameter by 240 foot long culvert including:
      i) Trenching
      ii) Pipe placement
      iii) Installation of rock and log energy dissipator at culvert outfall.
      iv) Installation of rock headwalls at the culvert inverts

e) Reconstruction of the fill embankment on engineered fill. Fill embankments to be drained, keyed and benched into firm native soils.
f) Excess and deterious soils to be placed as compacted non-structural fill on the adjacent landing.
g) Improving road drainage on the portion of Old Haul Road leading to the crossing site by installing new and reconstructing existing rolling drain dips.
h) Rerocking the crossing site and portions of the access road with rock aggregate.

B. OLD HAUL ROAD IMPROVEMENTS

1. Portions of Old Haul Road extending 2 miles from Wurr Road to Dark Gulch are locally poorly drain and in need of improvements to reduce the potential for erosion with sediment delivery to stream channels and to improve long term road access. The project proposes the installation of road drainage improvements.
2. The Work to be performed by the CONTRACTOR consists of providing all labor, services, tools, machinery, equipment, and materials necessary to complete the project as outlined in the drawings. The Work includes, but is not limited to the following items:
   a) Regrade and reshape road prism
   b) Cleaning, reconstructing and installing new drain dips (reverse grade dips, knicks, waterbars and knockouts)
   c) Cleaning, reconstructing and installing new ditch relief culverts
   d) Cleaning and installing new road drainage ditches
   e) Apply rock aggregate to the road tread

C. The CONTRACTOR is responsible for implementing SWPPP requirements

D. All work and materials shall conform to project documents, applicable requirements of latest edition of the California Building Standards Code, applicable San Mateo County ordinances, and any requirements of the permitting agencies including California Department of Fish and Wildlife 1600 agreement requirements.

E. All work shall be in conformance with applicable Occupation Safety and Health Administration (OSHA) standards as set for by the Federal Department of Labor and/or the State of California

F. The CONTRACTOR shall keep himself fully informed of all applicable codes, laws, ordinances and regulations of any jurisdiction or authority, and shall adhere strictly thereto. Compliance with all laws, ordinances and regulations of Federal, State, County and Local agencies shall take precedence over all other Contract documents.

G. The CONTRACTOR shall have required fire suppression equipment onsite as required by CALFIRE.

1.3 WORK SEQUENCE

A. The CONTRACTOR is responsible for establishing a construction schedule per the General Conditions, to be approved by the OWNER, and for the sequence and progress of the work. CONTRACTOR shall be solely responsible for coordination of all the work within the time limits specified in the contract.

1.4 CONTRACTOR USE OF PREMISES

A. Construction staging areas will be restricted to existing roads or other areas as shown on Drawings and where permitted by the OWNERS representative. Alternative staging areas

may be allowed pending review by the ENGINEER prior to commencement of work.

B. CONTRACTOR'S use of the premises shall be confined to the areas approved by the OWNER.

C. No area within the contract limits is available for the exclusive use of CONTRACTOR. Use of CONTRACTOR'S work areas and any mobilization areas shall be at CONTRACTOR'S own risk.

1.5 SITE CONDITIONS

A. Existing Grades: Existing grades may vary from those indicated on the Drawings due to grading, erosion, or other changes that may have occurred after the site survey.

B. Existing Features: CONTRACTOR shall field verify the location of existing features and locate any underground utilities.

C. The CONTRACTOR shall enforce safety procedures to minimize hazards to workers, the public, and the environment.

1.6 SUBMITTALS

A. Written plan of CONTRACTOR'S proposed sequence of construction. Submit within fifteen (15) days after the Notice to Proceed and receive ENGINEER'S approval prior to commencing the work.

B. Hazardous Materials Controls and Spill Prevention Plan

C. Traffic Control Plan.

D. Other submittals as specified in the Contract Documents.

1.7 CONSTRUCTION QUALITY ASSURANCE

A. The CONTRACTOR is responsible for material and other testing in accordance with the Drawings and Specifications.

B. The OWNER may hire an independent Construction Quality Assurance (CQA) testing firm to verify that construction is completed in accordance with the Drawings and Specifications. It is the CONTRACTOR'S responsibility to coordinate and cooperate with the OWNER'S Engineer of Record representative(s) at all times. Areas that are deemed not in compliance or that do not meet the requirements of the Drawings and Specifications (including failed CQA test results) must be repaired by the CONTRACTOR to the requirements of the Drawings and Specifications at no additional cost to the OWNER.

2 EXECUTION - NOT USED

3 MEASUREMENT AND PAYMENT - NOT USED

END OF SECTION

SECTION 014200
REFERENCES

SECTION 014200
REFERENCES

1 GENERAL

1.1 DESCRIPTION

A. Section includes

Abbreviations
Slope Notation
Definitions

1.2 RELATED SECTIONS

A. Information provided in this section is used where applicable in individual specification sections.

1.3 ABBREVIATIONS

A. Whenever these abbreviations are used in the specifications, they represent the following:

AASHTO	American Association Of State Highway And Transportation Officials
ANSI	American National Standards Institute
AQ	Actual Quantities
CO	Contracting Officer
CEG	Engineering Geologist
CF	Cubic Feet
CY	Cubic Yard
DQ	Design Quantities
EA	Each
hr	Hour
lb	Pound
LF	Linear Feet
LS	Lump Sum
LSQ	Lump Sum Quantities
mi	Mile
OSHA	Occupational Safety & Health Administration
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
SF	Square Feet
SQ	Staked Quantities
SY	Square Yard
WWPA	Western Wood Products Association

1.4 SLOPE NOTATION (VERTICAL: HORIZONTAL)

A. For slopes flatter than 1:1, express the slope as the ratio of one unit vertical to a number of units horizontal. For slopes steeper than 1:1, express the slope as the ratio of a number of units vertical to one unit horizontal. For example 1.5:1 Is equal to 1.5 horizontal by 1.0 vertical.

1.5 DEFINITIONS

The following terms, or pronouns in place of them, are used in these specifications or in other contract documents, the intent and meaning are as follows:

Approved. When used to convey Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.
Borrow. Suitable materials taken from approved sources designated on the plans or on the ground.
Clearing Limit. The area over and beside the trail that is cleared of trees, limbs, and other obstructions.
Compacted. Consolidation that is obtained by tamping or rolling suitable material until no noticeable displacement of material is observed.
Designated on the Ground. The location of materials, work areas, and construction items, including lines and grades, marked on the ground with stakes, flagging, tags, or paint.
Directed. A command or instruction by Engineer. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
Drainage Dips. A structure cut into the roadbed used for turning water off the road, includes reverse grade dips, knicks and waterbars.
Duff. Organic material overlying rock or mineral soil.
Embankment. A structure of suitable material placed on the prepared ground surface and constructed to the roadbed elevation.
Engineered Fill: Material placed as structural fill conforming to Section 312300 Excavation and Fill
Excess Excavation. Material in the in excess of that needed for construction as specified on the Drawings.
Furnish. Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
Grade. The vertical distance of ascent or descent of the slope expressed as a percentage of the horizontal distance.
Hazard Tree. An unstable tree that is likely to fall and impact the work area.
Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
Inslope. Where the road tread is sloped downward toward the backslope.
Install. Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
Leave Tree. Trees designated to be left or to remain undisturbed after construction.
Mineral Soil. Soil or aggregate that is free from organic substances and contains no particles larger than 2 inches at their greatest dimension.
Non-Structural Fill: Surplus and deterious soils placed as non-structural fill conforming to Section 312300 Excavation and Fill
Outslope. Where the road tread is sloped downward away from the embankment or daylight side of the roadbed.

Project Site / Work Area. Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
Provide. Furnish and install, complete and ready for the intended use.
Regulations. Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work**.**
Sideslope. The natural slope of the ground, usually expressed as a percentage.
Slough. That material from the backslope that has raveled onto the roadbed.
Surfacing. Material placed on top of the roadbed or base course that provides the desired tread.
Select Material. Soil free of duff with a recognizable granular texture.
Roadbed. The finished surface on which base course or surfacing may be constructed. For trails without surfacing the roadbed is the tread.
Tread. The surface portion of the trail upon which traffic moves.
Watercourse. Any natural or constructed channel where water naturally flows or will collect and flow during spring runoff, rainstorms, etc.

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS
(a.k.a. Mobilization & Demobilization)

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS
(a.k.a. Mobilization & Demobilization)

1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of the construction facilities and temporary controls, including mobilization and demobilization, as specified, as shown on the Drawings, or as otherwise directed by the ENGINEER. Work includes traffic control, temporary fencing – type ESA, and temporary erosion control items.

B. Mobilization shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, safety and security precautions, equipment, supplies, and incidentals to the site; for the establishment of all offices, traffic control, temporary fencing, restrooms and other facilities necessary for work on the project; and for all other work and operations which must be performed, or costs incurred prior to beginning work, on the various items on the project site.

C. Demobilization shall consist of work and operations necessary to disband all mobilized items and cleanup the site. The removal of all temporary crossings, ramps, access ways, roads, signs, and fencing; dewatering facilities; and temporary facilities or works, and the restoration of surfaces to an equal or better than existing condition shall also be included as part of demobilization.

D. All work shall comply with the approved Storm Water Pollution Prevention Plan (SWPPP).

1.2 RELATED SECTIONS

015713 TEMPORARY EROSION CONTROL
015723 SWPPP IMPLEMENTATION
015626 TEMPORARY FENCE TYPE ESA

1.3 REFERENCE STANDARDS – NOT USED

1.4 SUBMITTALS – NOT USED

1.5 MATERIALS

A. Temporary construction and protection fencing

B. Unless otherwise indicated, protection fencing shall consist of plastic high visibility safety fencing (Type ESA) or approved high visibility flagging subject to ENGINEERS approval.

C. Required fire suppression equipment onsite as required by CALFIRE.

1.6 QUALITY ASSURANCE – NOT USED

2 EXECUTION

2.1 CONTRACTOR'S PLANT AND EQUIPMENT

A. Security. CONTRACTOR shall, at all times, be responsible for security of their work area and

equipment. OWNER shall not be responsible for missing or damaged equipment, tools, or personal belongings.

B. Construction Power and Communication Facilities. CONTRACTOR shall be responsible for providing sufficient electrical power and communication facilities to construct the work.

C. Storage Facilities.

1. Provide storage facilities for the protection of materials and supplies from weather, and shall keep the facilities clean and in proper order at all times.

2. Provide a storage area for lubricants, oils, and hazardous materials with sufficient means to contain spills. Facilities, handling, and any required cleanup will comply with all current local, state, and federal standards. Petroleum products stored on the site shall be secured from vandalism.

D. Sanitary Facilities. Maintain adequate toilet facilities at or near the work site.

E. Solid Waste Handling. Provide sufficient solid waste handling facilities to maintain site in a clean, orderly condition.

F. Water. Water is available onsite at the entrance to Quarry Park .The water facilities will be described at the prebid meeting.

2.2 MOBILIZATION AND DEMOBILIZATION

A. Perform mobilization and demobilization activities in accordance with the Drawings, and as specified.

2.3 FIRE SUPPRESSION

A. The CONTRACTOR shall have required fire suppression equipment onsite as required by CALFIRE.

2.4 PROJECT SIGNS

A. Construction area signs shall be furnished, installed, maintained, and removed by the CONTRACTOR when no longer required. The locations of the required signs to be determined by the ENGINEER or OWNER.

B. Construction signs shall have a minimum dimension of 2 ft x 2 ft (min) and consist of plywood bolted to two signposts, furnished and installed by CONTRACTOR on all roads and trails leading to the work area. Project signs shall be installed plumb and level. Letter and numbers shall be black on a white background. The sign information shall be as shown below:

KEEP OUT - DO NOT ENTER
CONSTRUCTION AREA
San Mateo County Parks
Expected Completion Date: _____

C. All construction area signs shall be installed prior to start of construction and maintained in place for the duration of the project by CONTRACTOR. Signs shall be repaired or replaced at no cost to the MCOSD, if damaged or stolen. CONTRACTOR shall remove the signs and posts at the completion of the project and with prior approval of CEG.

2.5 EXCAVATION

A. The CONTRACTOR, and any SUBCONTRACTOR, is required to notify U.S.A. forty-eight hours in advance of performing excavation work, by calling the toll free number (800) 642-2444.

2.6 PROTECTIVE BARRIERS

A. Protective barriers shall be erected around sensitive areas as designated on the Drawings or as directed by the ENGINEER. Barriers shall be constructed using plastic high visibility safety fencing (Type ESA) or, if approved, high visibility flagging.

B. Temporary fencing shall be maintained during construction. Except as directed by the ENGINEER. Barriers shall be removed after completion of work.

C. Tree Protection shall be erected around trees as required to protect trees, as designated on the Drawings, or directed by the ENGINEER. Fencing shall be constructed using bright orange plastic safety fencing (type ESA) or bright orange flagging as approved by the ENGINEER.

D. Upon completion of project, CONTRACTOR shall remove temporary fences and they shall become the property of CONTRACTOR and shall be disposed of by the CONTRACTOR

2.7 STAGING AREAS

A. General. Staging areas at the project site are provided for the CONTRACTOR'S use and are shown on the Drawings. By making these areas available to the CONTRACTOR, the ENGINEER, and any other person or agency connected with the properties shall in no way be responsible or liable for any activity of the CONTRACTOR, SUBCONTRACTORS, or any individual or organization connected with the project.

B. Impacts to the access routes must be minimized and disturbance along the access route shall be restored to pre-construction conditions upon project completion.

C. The CONTRACTOR shall carefully preserve the surrounding property by confining operations within the limits of work. Construction work or equipment operations shall not be conducted outside the designated work area boundary without approval of the OWNER.

D. Access over existing roads outside the work area shall be maintained. If through access cannot be maintained, a schedule for closure must be approved by an OWNER'S representative.

E. No area within the contract limits is available for the exclusive use of CONTRACTOR. Use of CONTRACTOR'S work areas and any mobilization areas shall be at CONTRACTOR'S own risk, and OWNER shall not be held liable for any damage or loss of materials or equipment located within such areas.

F. Alternative staging areas. Alternative sites must be acceptable to OWNER, and the CONTRACTOR must make all arrangements for their use at the CONTRACTOR'S expense, and in accordance with all local, state and federal regulations.

G. Additional storage areas**.** Should the CONTRACTOR require space in addition to that available on- site, the CONTRACTOR shall make arrangements for storage of materials and equipment in locations off the construction site, and shall provide the ENGINEER a copy of the letter of authorization for storage from the OWNER.

2.8 DUST CONTROL

A. General. The CONTRACTOR shall be responsible for the control of dust within the limits of

the project at all times. The CONTRACTOR shall take whatever steps are necessary to eliminate the nuisance of blowing dust. Responsibility for any damage to property, crops, or orchards from dust caused by the CONTRACTOR'S operations shall be borne by the CONTRACTOR.

B. Dust Control. Periodically, water or otherwise treat access roads and haul roads, as required to suppress dust. Trucks transporting fill material to and from the Project site must be tarped from the point of origin. After clearing, grading, earth moving or excavation is completed, the entire area of disturbed soil must be treated to prevent wind pickup of soil. This may be accomplished by: spreading soil binders; sufficiently wetting the area to form a crust on the surface, with repeated soakings as necessary to maintain the crust and prevent dust pickup by the wind; or other methods approved in advance by the Air Pollution Control District and the ENGINEER.

C. Cleanup. The CONTRACTOR shall keep all streets, roadways, and easements, as well as all ground adjacent to the project site, clean and free of dust, mud and debris resulting from the CONTRACTOR'S operations. Daily cleanup throughout the project shall be required as the CONTRACTOR progresses with the work. Spillage of earth, gravel, concrete, asphalt, or other materials resulting from hauling operations along or across any public street or private driveway or access road shall be removed immediately by the CONTRACTOR.

2.9 HAZARDOUS MATERIALS CONTROL AND SPILL PREVENTION PLAN

A. **General:** Before starting work on the project, the CONTRACTOR shall submit for acceptance by the ENGINEER a Hazardous Materials Controls and Spill Prevention Plan. The Plan shall include provisions for preventing hazardous materials from contaminating soil or entering water courses and shall establish a Spill Prevention and Countermeasure Plan.

B. **Facilities:** Provide staging and storage areas for equipment, as required to contain contaminants away from water courses. Provide a contained, locked storage facility for fuels, lubricants, construction chemicals and other hazardous materials and supplies stored at site. Provide a lined pit for concrete washdown, located where spills or overflow cannot enter nearby watercourses or storm drains. The pit shall be located a minimum of 75 feet from any flowing watercourse.

C. **Equipment Maintenance:** Clean and maintain equipment to prevent any leakage of fuel and lubricants. Establish a designated equipment refueling area. All fueling and maintenance of vehicles and other equipment and staging area shall occur at least 75 feet from any riparian habitat or water body.

D. **Spills Countermeasures:** Isolate work areas during in-water construction activities by using oil containment booms. Maintain a supply of oil booms, sorbent pads and other supplies to contain and clean spills. Contain and cleanup any hazardous material spills immediately and notify ENGINEER.

2.10 CONSTRUCTION SITE HOUSEKEEPING

A. Maintain the site in a neat and orderly manner throughout the construction process. Store all materials within approved staging areas.

B. Remove rubbish, trash, and debris from site on a regular basis. Transport and dispose of all rubbish and debris in accordance with all local regulations. Maintain staging area in an orderly manner. Regularly clean mud and debris, resulting from work at the site, from

roadways; per SWRCB General Permit governing pollution from construction activities, sweeping and washing construction site sediment tracked onto roadways into roadside ditches is a violation. Cleanup and dispose of all concrete debris and washings when concrete work is complete.

C. The CONTRACTOR is responsible to maintain all vehicles and equipment and to inspect them frequently for leaks. Equipment washing, refueling, and/or servicing shall not take place except with appropriate precautions to avoid fuel spills, at least 100 feet away from stream channels, for vehicle and equipment maintenance.

D. Clean up any spills on a dirt area by digging up and properly disposing of contaminated soil at an appropriate facility.

2.11 PROTECTION OF EXISTING IMPROVEMENTS

A. Existing facilities, utilities, and property shall be protected from damage resulting from the CONTRACTOR'S operations. Roadways and other improved surfaces shall be protected from damage by vehicles with tracks or lugs. Any damage resulting from the CONTRACTOR'S operations shall be repaired by the CONTRACTOR to the condition which existed prior to the damage, and to the satisfaction of the ENGINEER, at no additional cost to the OWNER.

2.12 RESTORATION OF STRUCTURES AND SURFACES

A. Structures, Equipment, and Pipework. The CONTRACTOR shall remove such existing structures, equipment, and pipework as may be necessary for the performance of the work, and shall rebuild, or replace, the items thus removed in as good a condition as found. CONTRACTOR shall repair any existing structures that were damaged as a result of the Work.

B. Roads and Streets. Roadways used by the CONTRACTOR for hauling materials, equipment, supplies, etc., shall be cleaned and repaired if the condition of the roadway is damaged, or otherwise affected, due to the CONTRACTOR'S operations.

C. Curbs, Gutters, Driveways, and Sidewalks. All curbs, gutters, driveways, sidewalks, and similar structures that are broken, or damaged, by the installation of the work shall be reconstructed by the CONTRACTOR. Reconstruction shall be of the same kind of materials with the same finish, and in not less than the same dimensions as to original work. Repairs shall be made by removing and replacing the entire portions between joints or scores, and not merely refinishing any damaged part. All restoration work shall match the appearance of the existing improvements, as nearly as possible.

D. Cultivated Areas and Other Surface Improvements. All cultivated and natural areas, either agricultural or lawns, and other surface improvements which are damaged by actions of the CONTRACTOR, shall be restored, including roadside drainage ditches, as nearly as possible, to their original conditions.

E. Old Haul Road. The portions of Old Haul Road used by the CONTRACTOR for access shall be restored to a condition equal or better than exited prior to construction. This work may include reinstallation of drainage dips, cleaning ditches and outfalls, and application of road aggregate. This work is separate from specified upgrades to the road.

2.13 STORAGE OF MATERIALS AND EQUIPMENT

A. Materials and equipment shall be stored so as to ensure the preservation of their quality

and fitness for the work. Stores of equipment and materials shall be located so as to facilitate inspection. The CONTRACTOR shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment, supplied by the CONTRACTOR, until completion and final acceptance of the Work by the OWNER.

2.14 TRAFFIC CONTROL

A. General. The CONTRACTOR shall be responsible for public safety and traffic control at all times.

B. The CONTRACTOR shall furnish, install, and maintain temporary construction warning signs, flaggers, barricades, and other devices necessary to safeguard the general public and the work, and to provide for the safe and proper routing of all vehicular and pedestrian traffic within and through the limits of the project during the performance of the work.

C. Traffic Control Plan. The CONTRACTOR will provide a traffic control plan to the ENGINEER for review and approval prior to project construction including: access points to staging areas, dump sites, operating hours, project duration, scheduling and phasing, and total number of construction vehicles and their respective haul routes, per project phase.

2.15 EROSION CONTROL

A. The CONTRACTOR shall be responsible to furnish, install and maintain all temporary erosion control and SWPPP measures as specified under:

1. 015713 EROSION CONTROL
2. 015723 SWPPP IMPLEMENTATION

B. All Costs in connection with this work shall be included in the contract price Mobilization and Demobilization in accordance with Section 015000.

C. Final Erosion Control and BMP's that are installed at the locations shown on the Drawings or as directed by the engineer shall be measured and payed separately under 015713 EROSION CONTROL

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Work under this section will be measured for payment on a lump sum basis.

3.2 PAYMENT

A. The lump sum contract price for Construction Facilities, Temporary Controls, also known as Mobilization and Demobilization**,** will include full compensation for the furnishing of all labor, materials, tools, equipment, administrative costs, and incidentals for mobilization; demobilization; and temporary facilities and controls.

B. Payment will be made under:

Pay Item	Pay Unit
Mobilization & Demobilization	Lump Sum

END OF SECTION

SECTION 015626:
TEMPORARY FENCE – TYPE ESA

SECTION 015626
TEMPORARY FENCE – TYPE ESA

1 GENERAL

1.1 DESCRIPTION

A. Work under this section includes furnishing all labor, materials, equipment, and incidentals to install, maintain, and remove Temporary Fence – Type ESA , as shown on the Drawings, as specified, or as otherwise directed by the Engineer.

1.2 RELATED SECTIONS

015000	MOBILIZATION
024100	DEMOLITION AND REUSE OF MATERIALS
311100	CLEARING AND GRUBBING
312316	STRIPPING AND EXCAVATION

1.3 REFERENCE STANDARDS

A. State of California, Department of Transportation (CALTRANS) State Standard Specifications, current edition

1.1 SUBMITTALS

A. Submit to the Engineer, for review, the following:
   1. Manufacturer's data for proposed fencing fabric.
   2. Manufacturer's data or descriptive literature for proposed fence posts.

1.2 MATERIALS

A. High Visibility Fabric. High visibility fabric shall be machine produced, orange colored mesh manufactured from polypropylene or polyethylene. High visibility fabric may be made of recycled materials. Materials shall not contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. High visibility fabric shall be fully stabilized ultraviolet resistant and a minimum of four feet in width with a maximum mesh opening of 2" x 2". High visibility fabric shall be furnished in one continuous width and shall not be spliced to conform to the specified width dimension.

B. Posts. Posts for temporary fence (Type ESA) shall be of one of the following:
   1. Wood posts shall be fir or pine, shall have a minimum cross section of 2" x 2", and a minimum length of 5.25 feet. The end of the post to be embedded in the soil shall be pointed. Wood posts shall not be treated with wood preservative.
   2. Steel posts shall have a "U," "T," "L," or other cross sectional shape that resists failure from lateral loads. Steel posts shall have a minimum weight of 0.75 pounds per linear foot and a minimum length of 5.25 feet. One end of the steel post shall be pointed and the other end shall have a high visibility colored top.

C. Fasteners. Fasteners for attaching high visibility fabric to the posts shall be as follows:

1. The high visibility fabric shall be attached to wooden posts with commercial quality nails or staples, or as recommended by the manufacturer or supplier.
2. Tie wire or locking plastic fasteners shall be used for attaching the high visibility fabric to steel posts. Maximum spacing of tie wire or fasteners shall be 24 inches along the length of the steel post.

D. Used materials may be installed provided the used materials conform to these specifications.

1.3 QUALITY ASSURANCE – NOT USED

2 EXECUTION

2.1 INSTALLATION

A. All fence construction activities shall be conducted from the work side of the ESA as shown on the Drawings or as flagged in the field by the Engineer.

B. Posts shall be embedded in the soil a minimum of 16 inches. Post spacing shall be eight feet maximum from center to center and shall at all times support the fence in a vertical position.

C. Temporary fence (Type ESA) shall be constructed prior to clearing and grubbing work, shall enclose the foliage canopy (drip line) of protected plants, and shall not encroach upon visible roots of the plants.

D. Temporary fence (Type ESA) shall be located so that it is clearly visible, as determined by the Engineer.

2.2 MAINTENANCE

A. Temporary fence (Type ESA) that is damaged during the progress of the work shall be repaired or replaced by the Contractor the same day the damage occurs.

2.3 REMOVAL

A. When Type ESA fence is no longer required, as determined by the Engineer, it shall be removed, except when reused as provided in this section.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Temporary Fence – Type ESA will not be separately measured for payment.

3.2 PAYMENT

A. No separate payment will be made for Temporary Fence – Type ESA. Full compensation for all costs associated with this work shall be included in the contract price Mobilization and Demobilization in accordance with Section 015000.

END OF SECTION

SECTION 015639:
TEMPORARY TREE AND PLANT PROTECTION

SECTION 015639
TEMPORARY TREE AND PLANT PROTECTION

1 GENERAL

1.1 DESCRIPTION

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. DEFINITIONS

1. Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated on Drawings or as directed by the ENGINEER.

1.2 RELATED SECTIONS

015000 MOBILIZATION
024100 DEMOLITION AND REUSE OF MATERIALS
311100 CLEARING AND GRUBBING
312316 STRIPPING AND EXCAVATION

1.3 REFERENCE STANDARDS

ANSI A300 (Part 1)

1.4 SUBMITTALS – NOT USED

1.5 QUALITY ASSURANCE

A. By approval of County arborist or ENGINEER

1.6 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones (zones protected by construction fencing or sensitive species fencing) unless approved by the Owner Representative:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Erection of sheds or structures.
4. Impoundment of water.
5. Excavation or other digging unless otherwise indicated.
6. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

1.7 MATERIALS

A. Protection-Zone Fencing

1. Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart. High-visibility orange color, nonfading. Height of Fencing: 4 feet. Use section of plastic protection-zone fencing as gate. Previously used materials may be used when approved by OWNER'S Representative.

B. Protection-Zone Flagging

1. Highly visible flagging or approved equal tied off to posts or to existing vegetation as approved by the engineer ENGINEER.

C. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

2 EXECUTION

2.1 PROTECTION-ZONE FENCING AND FLAGGING

A. Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected area except by entrance gates. Protection-Zone Flagging may be used on approval of the ENGINEER

1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to OWNER'S Representative.
2. Access Gates: Install where indicated.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by OWNER'S Representative.

C. P

D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by OWNER'S Representative.

E. Maintain protection-zone fencing, flagging, and signage in good condition as acceptable to OWNER'S Representative and remove when construction operations are complete and equipment has been removed from the site.

2.2 EXCAVATION

A. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

B. Do not allow exposed roots to dry out before placing permanent backfill.

2.3 ROOT PRUNING

A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp

pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.

2. Temporarily support and protect roots from damage until they are permanently covered with soil.
3. Cover exposed roots with burlap and water regularly.
4. Backfill as soon as possible to satisfaction of the ENGINEER

B. Root Pruning at Edge of Protection Zone: Prune roots by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow- tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

2.4 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
2. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
3. Cut branches with sharp pruning instruments; do not break or chop.
4. Do not apply pruning paint to wounds.

B. Chip removed branches and spread over areas identified by OWNER'S Representative.

2.5 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

2.6 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports if directed by the OWNER'S Representative.

2.7 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by OWNER'S Representative.

1. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
2. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
3. Perform repairs within 24 hours.
4. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by OWNER'S Representative.

2.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Mechanically chip all woody debris less than 8 inches of diameter. Chipped material to be either stockpiled in an approved location and configuration, or used as mulch for erosion control as approved by the ENGINEER

B. Move and stockpile logs, stumps and large branches and other woody debris to approved locations shown on Drawings or as directed by the ENGINEER.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Section 015639: Temporary Tree and Plant Protection will not be separately measured for payment.

3.2 PAYMENT

A. No separate payment will be made for Temporary Tree and Plant Protection. Full compensation for all costs associated with this work shall be included in the contract price Mobilization and Demobilization in accordance with Section 015000.

END OF SECTION

SECTION 015713:
EROSION CONTROL

SECTION 312500:
EROSION CONTROL

1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of furnishing all labor, equipment, and materials necessary to complete temporary and final erosion control and water or air quality control measures, devices, and BMPs specified in the Contract Documents, shown on the Drawings, or as directed by the ENGINEER. It also includes removing, and disposing of Temporary Erosion and Sediment Control measures.

B. The erosion control measures shall be designed and implemented to prevent erosion and scour, to treat sediment laden water for acceptable discharge, and to prevent the conveyance of sediment into surface waters, drainage systems, and environmentally critical areas.

C. Attention is directed to the "Storm Water Pollution Prevention Plan". As part of the SWPPP certification and submittal process, the CONTRACTOR shall submit two (2) copies of any proposed revisions to the applicable Project Plan sheets for Temporary Erosion Control and the Dewatering and/or Diversion operations. Do not start work until the SWPPP, applicable plan sheets, schedules and methods of operation for temporary pollution control are reviewed and accepted by the ENGINEER and RWQCB. The project must satisfy the requirements of all permit(s) issued for the project. During the course of project construction, cooperate with the ENGINEER, the OWNER and other regulatory officials and take immediate action as directed to protect water bodies and sensitive areas, and provide for erosion or other pollution control.

1.2 RELATED SECTIONS

015000	MOBILIZATION
015713.01	FIBER ROLL
015713.02	SILT FENCE
312319	DEWATERING
015723	STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IMPLEMENTATION
311100	CLEARING AND GRUBBING
312316	STRIPPING AND EXCAVATION
312323	ENGINEERED AND NON-STRUCTURAL FILL

1.3 REFERENCE STANDARDS

A. State of California, Department of Transportation (CALTRANS) State Standard Specifications (current edition).

1.4 SUBMITTALS

A. Submit to the ENGINEER, for review, product data and certifications of all products.

1.5 MATERIALS

A. Fiber Roll:

1. Section 015713.01 Fiber Roll
2. Use BIO-12 Straw Wattles by California Straw Works or approved equivalent.

B. Silt Fence:

1. Section 015713.02 Silt Fence

C. Biodegradable Erosion Control Blanket:

1. ECTC Type 2D and made of processed natural fibers that are mechanically, structurally, or chemically bound together to form a continuous matrix that is surrounded by 2 natural nets.
2. Use Tensar Rollmax C125BN or approved equivalent.

D. Straw bales:

1. Standard rectangular rice straw or certified weed free wheat straw bound by twine.

E. Native Mulch and Slash:

1. Obtain onsite

F. Straw Mulch:

1. Rice straw or certified weed free wheat straw furnished in air-dry condition with a consistency compatible for application with commercial straw-blowing equipment.

G. Seed:

1. All seed mixes must be approved by the San Mateo County Parks Department, Natural Resource Management team. Seed mix will consist of seed that is fresh, clean, and mixed by an approved method. All seeds will be in conformance with the CA State Seed law of the Department of Agriculture. Each seed bag will be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee and testing dates. In addition, the container will be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. Prior to seeding at the request of the San Mateo County Parks Department representative, the Contractor will provide a letter of certification, original Association of Official Seed Analysts (AOSA) certified seed test results, and calculations of PLS content. The San Mateo County Parks Department representative may at the time of delivery examine the seed and sample the seed using methods recognized by the AOSA.

1.6 QUALITY ASSURANCE

A. At the preconstruction conference, the CONTRACTOR shall be prepared to discuss temporary erosion and sedimentation controls.

B. Installed to the satisfaction of the ENGINEER and conform to applicable codes and to the approved SWPPP.

2 EXECUTION

2.1 TEMPORARY EROSION CONTROL

A. During construction, the CONTRACTOR shall incorporate practices that prevent erosion, or control erosion when prevention is unavoidable, and shall make every effort to maintain effective erosion and sediment controls throughout the work, including implementing timely corrective actions as may be necessary. Sediment shall be prevented from entering any surface water, drainage facility, and natural drainage system and shall be prevented from transport to beyond the project site.

B. Work shall comply with the approved SWPPP.

C. The following strategies to ensure that storm water pollution is prevented shall be employed:

1. Minimize erosion and sedimentation during construction.
2. Eliminate pollution of storm runoff by chemicals and materials used in the construction process.
3. All temporary erosion and sediment controls shall be in place prior to the commencement of construction as well as at the end of each work day. At a minimum, silt fences, or equivalent apparatus, shall be installed at the perimeter of the construction site to prevent construction related runoff and/or sediment from entering into the watercourses.
4. The CONTRACTOR (and Permitee) shall monitor weather forecasts and take appropriate precautions in advance of storm events.

D. Install temporary soil stabilization materials for water pollution control in all disturbed work areas that are considered inactive (i.e. excess of 14 days) or before forecast storm events. Should any temporary erosion control of this nature be required elsewhere as directed by the ENGINEER and/or regulatory agencies, install them within 48 hours of notification. Where applicable and upon acceptance of the ENGINEER, furnish and apply/install temporary mulch, temporary hydraulic mulch, temporary erosion control blankets, or temporary covers in conformance with the Standard Specifications and these Technical Specifications. Materials and construction methods shall comply with the Standard Details shown on Drawings, SWPPP, and these Technical Specifications.

E. The CONTRACTOR shall have tools, equipment, and materials to install the erosion control measures before beginning construction.

F. Erosion control Best Management Practices (BMP's), including straw bale barriers, silt fences, fiber rolls (wattles), gravel bag sediment barriers and/or other means shall be employed to prevent turbid runoff from discharging into ponds or creeks.

G. Earthmoving equipment shall be inspected prior to leaving the site and, if necessary, cleaned to prevent sediment transport off-site.

H. Stockpiles. Install and maintain appropriate BMPs (sediment logs, filter fence, check dams, etc.) around the perimeter at the base of stockpile to control the potential runoff of any loose sediments and pollutants.

I. Maintain all temporary erosion control measures, devices, and/or BMPs placed in the work for the duration of the project. Maintenance includes all Manufacturer recommendations, and includes but is not limited to the following

1. Immediately repair upon discovery damage to any temporary erosion control devices and/or BMPs during the course of the project at the CONTRACTOR'S expense Inspect temporary erosion control devices and/or BMPs routinely, immediately after each rainfall event, and at least daily during prolonged rainfall events. Make required repairs immediately.
2. Inspect construction limit and tree protection fencing daily and repair, secure, and/or replace as necessary to maintain and preserve its intended purpose.
3. Routinely inspect all signage as required for the project and repair or replace upon discovery of damage, vandalism, and/or missing parts.
4. Should the filter fence fabric decompose or become ineffective prior to the end of the

expected usable life and the barrier is still necessary, replace fabric promptly.

5. Routinely inspect stakes and/or rope used to secure a sediment log in place and repair as necessary if found to be loose or ineffective.
6. Remove sediment deposits and other debris when they reach approximately one-third the height of the sediment barrier (or as recommended by the Manufacturer) and dispose of in a manner acceptable to the ENGINEER, and in conformance with the SWPPP.
7. Remove and dispose of sediment deposits remaining in place after the temporary erosion control measure and/or BMPs is no longer required in a manner acceptable to the ENGINEER, and in conformance with the SWPPP.

2.2 FINAL EROSION AND SEDIMENT CONTROL

A. Incorporate final erosion control measures as specified in the construction documents, shown on Drawings, or directed by the ENGINEER at the earliest practicable time.

B. Newly exposed soils outside of the road running surface greater than 50 square feet (sf) and with less than 80% ground coverage of natural vegetation shall be treated in order to reduce the potential for short-term sheet and rill erosion.

1. Seed:
   a) Spread seed mix after all grading has been completed, before spreading straw or mulch on the site. Finished grading shall leave tractor cleat marks, preferably perpendicular to slope. Seed mix should be spread at a rate of 40 lbs/acre. Lightly rake seed into soil and cover with 1 to 2 inches of straw. Seed may not be applied until late September or October to promote successful germination.
2. Mulch:
   a) Native Mulch and Slash
      i) Where feasible and available, native mulch or slash shall be used instead of straw mulch.
      ii) Native vegetation cleared at work sites shall be stockpiled and re-applied on the disturbed ground surface as directed by the ENGINEER.
      iii) Native mulch shall consist of duff and/or small diameter woody debris lopped into maximum 12 inch length to promote good contact with the soil surface.
      iv) Spread slash shall be lopped or tractor crushed to promote good contact with the soil surface. Slash, straw and seed may also be combined on finished ground surfaces
   b) Straw:
      i) Spread straw so that it is one and one half to two inches thick, and coverage exceeds 90% of ground surface, or better.
3. Erosion Control Blanket:
      i) Exposed slopes greater than 1.5H:1V with the exposed slope distance exceeding 20 lf in a downslope direction shall be covered with approved erosion control blanket in accordance with the manufacturer's recommendations, contract documents, and as directed by the ENGINEER. This specification does not apply to exposed slopes that are shorter than 20 lf in a downslope direction
4. Fiber Roll:
   a) Where the exposed slope exceeds 20 lf in downslope direction, install straw roll(s) at

15’ O.C. per standard specifications. Use BIO-12 Straw Wattles by California Straw Works or equivalent.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Temporary Erosion Control

1. Temporary Erosion Control and SWPPP implementation will not be separately measured for payment. All Costs in connection with this work shall be included in the contract price Mobilization and Demobilization in accordance with Section 015000.

B. Final Erosion Control

1. Final Erosion Control and BMP’s that are installed at the locations shown on the Drawings or as directed by the engineer shall be measured by unit length or area.

3.2 PAYMENT

A. Fiber Roll will be paid for at the contract price per linear foot, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary to install.

1. Fiber Rolls required or used on a short term basis that are not permanently staked in place or are anticipated to be moved on a daily or routine basis (such as areas immediately adjacent to trench excavations, temporary stockpiles, active areas for soil processing/screening operations, spill containment devices, etc.) shall be considered as included in prices paid for the various contract items of work involved, and no additional compensation will be allowed.

B. Seed and mulch will be paid for at the contract price per square yard, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary to install.

C. Erosion Control Blanket will be paid for at the contract price per square yard, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary to install.

D. Payment shall be made under:

Pay Item	Pay Unit
Seed and mulch	Square Yard
Fiber Roll	Linear Foot
Erosion Control Blanket	Square Yard

END OF SECTION

SECTION 015713.01
FIBER ROLL

SECTION 015713.01
FIBER ROLL

1 GENERAL

1.1 DESCRIPTION

A. Work under this Section includes furnishing all labor, materials, equipment, and incidentals to install, maintain, remove and dispose of Fiber Roll, as shown on the Drawings, as specified in the Storm Water Pollution Prevention Plan, as specified herein, or as otherwise directed by the Engineer.

B. Fiber Roll shall be furnished, installed, and maintained at the locations shown on the Drawings, as specified, and as indicated on the approved Storm Water Pollution Prevention Plan. Fiber Roll shall be installed on excavation and embankment slopes and other disturbed soil areas, active or non-active.

1.2 RELATED SECTIONS

015000	MOBILIZATION
015723	STORMWATER POLLUTION PREVENTION PLAN DEVELOPMENT AND IMPLEMENTATION
312316	STRIPPING AND EXCAVATION
313519.16	SLOPE PROTECTION FABRIC

1.3 REFERENCE STANDARDS – NOT USED

1.4 SUBMITTALS

A. Submit to the Engineer, for review, the following manufacturer's data and certification's:

1. A certificate stating the name of the Fiber Roll manufacturer, product name, style compositions of filaments or yarns and other pertinent information to fully describe the geotextile, along with the manufacturer's certification of compliance with the material specifications contained herein.

1.5 MATERIALS

A. Fiber Roll materials may generally be either of the two types indicated below, unless coir rolls are specifically specified on the Drawings. Where coir rolls are indicated on the drawings, straw rolls will not be allowed as a substitute.

B. Coir Roll.

1. A pre-manufactured roll made from coconut fiber encapsulated within a biodegradable jute, sisal, or coir fiber netting. The use of plastic/photodegradable netting shall not be allowed. The netting shall have a minimum durability of 2 years after installation. The netting shall be secured tightly at each end of the roll. Rolls shall be between eight inches and 12 inches in diameter. Rolls between eight inches and ten inches in diameter shall have a minimum weight of one pound per linear foot and a minimum length of 20 feet. Rolls between ten inches and 12 inches in diameter shall have a minimum weight of three pounds per linear foot and a minimum length of 10 feet.

C. Straw Roll. Straw Roll shall be:

1. A pre-manufactured roll made from 100% weed free rice straw and wrapped in a 100% biodegradable tubular 7 oz. Plain Burlap liner. The burlap is Medium Weight Natural Burlap with a 9 X 8 Warp & Fill, and a minimum weight of 7 oz. per square yard. Plastic netting will not be accepted as an alternate. 9-inch rolls shall have a minimum weight of approximately 1.6 pounds per foot. 12-inch rolls shall have a minimum weight of approximately 3.8 pounds per foot.
2. BIO-12 Straw Wattles by California Straw Works or approved equivalent conforms to this requirement.

D. Stakes.

1. Wood stakes shall be a minimum of 2" x 4" x 24" (ripped diagonally) for Type 1 installation or a minimum of 1" x 2" x 24" in size for Type 2 installation. Wood stakes shall be untreated fir, redwood, cedar, or pine and cut from sound timber. They shall be straight and free of loose or unsound knots and other defects which would render them unfit for the purpose intended. Metal stakes shall not be used.

E. Rope

1. Rope shall be biodegradable, such as sisal or manila, with a minimum diameter of 1/4 inch.

1.6 QUALITY ASSURANCE – NOT USED

2 EXECUTION

2.1 INSTALLATION

A. Fiber Roll shall be installed as follows:

B. Type 1: Furrows shall be constructed to a depth between three inches and four inches, and to a sufficient width to hold the Fiber Roll. Soil excavated from the trench shall be placed on the uphill or flow side of the roll to prevent water from undercutting the roll. Stakes shall be driven through the center of the roll (perpendicular to the finished grade) at 36 inches apart along the length of the Fiber Roll and stopped at 12 inches from each end of the rolls. Stakes shall be driven to between two and three inches above the top of the roll.

C. Type 2: Rope and notched stakes shall be used to restrain the Fiber Rolls against the slope. Stakes shall be driven into the slope until the notch is even with the top of the Fiber Roll. Rope shall be knotted at each stake and laced between stakes. After installation of the rope, stakes shall be driven into the slope such that the rope will hold the Fiber Roll tightly to the slope. Furrows will not be required.

D. Fiber Roll shall be placed 10 feet apart along the slope for slope inclination (horizontal:vertical) of 2:1 and steeper, 15 feet apart along the slope for slope inclination between 2:1 and 4:1, 20 feet apart along the slope for slope inclination between 4:1 and 10:1, and a maximum of 50 feet apart along the slope for slope inclination of 10:1 and flatter.

E. The bedding area for the Fiber Roll shall be cleared of obstructions including rocks, clods, and debris greater than one inch in diameter before installation.

F. Fiber Roll shall be installed approximately parallel to the slope contour and the terminus of rows shall be angled up-slope at 45 degrees for a distance of three feet. Where fiber rolls meet, provide an overlap of two feet, with adjacent rolls tightly abutting each other.

G. Fiber Roll shall be installed prior to seeding where used without slope protection fabric.

H. Fiber roll shall be installed over fabric (after seeding) where slope protection fabric is specified.

2.2 MAINTENANCE

A. The Contractor shall inspect all Fiber Roll immediately after each rainfall, and at least daily during prolonged rainfall. Any deficiencies shall be immediately corrected by the Contractor.

B. The Contractor shall also make a daily review of the location of Fiber Roll in areas where construction activities have altered the natural contour and drainage runoff to ensure that the Fiber Rolls are properly located for effectiveness. Where deficiencies exist as determined by the Engineer, additional Fiber Rolls shall be installed as directed by the Engineer.

C. Damaged or otherwise ineffective Fiber Roll shall be repaired or replaced promptly.

D. Fiber Roll shall be maintained to disperse concentrated water runoff and to reduce runoff velocities. Split, torn, or unraveling rolls shall be repaired or replaced. Broken or split stakes shall be replaced. Sagging or slumping Fiber Roll shall be repaired with additional stakes or replaced. Locations where rills and other evidence of concentrated runoff have occurred beneath the rolls shall be corrected. Fiber Roll shall be repaired or replaced within 24 hours of identifying the deficiency.

2.3 REMOVAL

A. Fiber Rolls shown on the Drawings shall remain in place after project completion, unless otherwise specified, and be allowed to naturally degrade.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Fiber Rolls will be measured by the linear foot of Fiber Roll installed at the locations indicated on the Drawings, as specified, or as directed by the Engineer.

B. Fiber Rolls that the Contractor installs for the implementation of Temporary Erosion Control and/or required by the SWPPP shall not be separately measured for payment.

3.2 PAYMENT

A. Fiber Rolls that will be paid for at the contract price per linear foot, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary to install, maintain throughout the construction, and, where specified, to remove Fiber Roll after site stabilization.

B. Fiber Rolls required or used on a short term basis that are not permanently staked in place or are anticipated to be moved on a daily or routine basis (such as areas immediately adjacent to trench excavations, temporary stockpiles, active areas for soil processing/screening operations, spill containment devices, etc.) shall be considered as included in prices paid for the various contract items of work involved, and no additional compensation will be allowed.

C. Payment shall be made under:

Pay Item	Pay Unit
Fiber Roll	Linear Foot

END OF SECTION

SECTION 015713.02
SILT FENCE

SECTION 015713.02
SILT FENCE

1 GENERAL

1.1 DESCRIPTION

A. Work under this Section includes furnishing all labor, materials, equipment, and incidentals to install, maintain, and remove silt fence, as shown on the Drawings, as specified in the Storm Water Pollution Prevention Plan, and as specified, or as directed by the Engineer.

B. This Specification is applicable to the use of a geotextile as a vertical, permeable interceptor designed to remove suspended soil from overland water flow. The function of a temporary silt fence is to filter and allow settlement of soil particles from sediment−laden water. The purpose is to prevent the eroded soil from being transported off the construction site by water runoff.

1.2 RELATED SECTIONS

312319 DEWATERING
015000 MOBILIZATION
015713 TEMPORARY EROSION CONTROL
312316 STRIPPING AND EXCAVATION
015723 STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IMPLEMENTATION

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. D 4355 − Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon−Arc Type Apparatus).
2. D 4491 − Test Methods for Water Permeability of Geotextiles by Permittivity.
3. D 4632 − Test Method for Grab Breaking Load and Elongation of Geotextiles.
4. D 4751 − Test Method for Determining Apparent Opening Size of a Geotextile.
5. D 4833 − Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
6. D 4873 − Guide for Identification, Storage, and Handling of Geotextiles.

1.4 SUBMITTALS

A. Submit to the Engineer for review, the following:

1. Manufacturer's Data and Certification:
   a) The Contractor shall provide the Engineer a certificate stating the name of the silt fence manufacturer, product name, style, chemical compositions of filaments or yarns and other pertinent information to fully describe the silt fence fabric.
   b) The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the Specification. Documentation describing the quality control program shall be made available upon request.

c) Manufacturing Quality Control (MQC) test results shall be provided upon request.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Silt fence fabric labeling, shipment and storage shall follow ASTM D 4873.

B. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

C. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.

D. Each silt fence roll shall be wrapped with a material that will protect the silt fence from damage due to shipment, water, sunlight, and contaminants.

E. The protective wrapping shall be maintained during periods of shipment and storage. If the wrapping is damaged prior to installation, the outer wrap of silt fence material must be discarded before installation.

F. During storage, silt fence rolls shall be elevated off the ground and adequately covered to protect them from the following: Site construction damage, extended exposure to ultraviolet (UV) radiation, precipitation, chemicals that are strong acids or strong bases, flames, sparks, temperatures in excess of 71 deg C (160 deg F)m and any other environmental condition that might damage the silt fence .

1.6 MATERIALS

A. At the Contractor's option, temporary silt fence shall be prefabricated or constructed with silt fence fabric, posts, and fasteners.

B. Silt Fence Fabric. Silt fence fabric shall be geotextile manufactured from woven polypropylene or polymer material. Silt fence fabric may be virgin, recycled, or a combination of virgin and recycled polymer materials. No virgin or recycled polymer materials shall contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. Silt fence fabric shall conform to the following requirements:

Specification	***Requirements***
Width, inches, min.	36
Grab tensile strength, KN (25 mm grip in each direction) ASTM Designation: D 4632*	0.45, min.
Elongation, percent minimum in each direction ASTM Designation: D 4632*	20, min.
Permittivity, 1/sec., min. ASTM Designation: D 4491	0.1−0.15
Ultraviolet stability, percent tensile strength retained after 500 hours, min. ASTM Designation: D 4355 (xenon−arc lamp and water spray weathering method)	90, min.
* or appropriate test method for specific polymer	

C. Posts. Posts for temporary silt fence shall be one of the following:

1. Untreated fir or pine, a minimum of 2" x 2" in size, and four feet in length. One end of

the post shall be pointed.

2. Steel and have a “U,” “T,” “L,” or other cross sectional shape that can resist failure from lateral loads. The steel posts shall have a minimum weight of 0.8−pound per foot and a minimum length of 4 feet. One end of the steel posts shall be pointed and the other end shall be capped with an orange or red plastic safety cap which fits snugly to the steel post. The Contractor shall submit to the Engineer for approval a sample of the capped steel post prior to installation.

D. Fasteners. Fasteners for attaching silt fence fabric to posts shall be as follows:

1. When prefabricated silt fence is used, posts shall be inserted into sewn pockets.
2. Silt fence fabric shall be attached to wooden posts with nails or staples as shown on the Drawings or as recommended by the manufacturer or supplier. Tie wire or locking plastic fasteners shall be used to fasten the silt fence fabric to steel posts. Maximum spacing of fasteners shall be eight inches along the length of the steel post.

2 EXECUTION

2.1 FIELD ASSEMBLY

A. The silt fence fabric shall be installed on the side of the posts facing the slope.

B. The silt fence fabric at the bottom of the fence shall be buried in a “J” configuration to a minimum depth of 150 mm (six inches) in a trench so that no flow can pass under the silt fence. Mechanically pushing 12 inches of the silt fence fabric vertically through the soil may be allowed if the Contractor can demonstrate to the Engineer that the silt fence fabric will not be damaged and will not slip out of the soil resulting in sediment passing under the silt fence fabric.

C. The trench shall be backfilled and the soil compacted over the upslope side of the silt fence fabric.

D. When joints are necessary, filter fence fabric shall be spliced together only at a support post, with a minimum twelve (12) inches overlap and securely sealed or stitched.

E. The Contractor must demonstrate to the satisfaction of the Engineer that the silt fence fabric can withstand a sediment load of 1/3 the height of the fence.

F. The posts shall be placed at the spacing as shown on the Drawings. Post should be driven or placed a minimum of 450 mm (18 inches) into the ground. Depth shall be increased to 600 mm (24 inches) if fence is placed on a slope of 3:1 or greater. Where 450 mm (18 inches) depth is impossible to attain, the posts should be adequately secured to prevent overturning of the fence due to sediment loading.

G. Support fence, if required, shall be fastened securely to the upslope side of the fence post. The support fence shall extend from the ground surface to the top of the silt fence fabric.

H. When self−supported fence is used, the silt fence fabric shall be securely fastened to fence posts.

I. Temporary silt fence shall be installed parallel with the slope contour in reaches not to exceed 500 feet. A reach is considered a continuous run of temporary silt fence from end to end or from an end to an opening, including joined panels. Each reach shall be constructed so that the elevation at the base of the fence does not deviate from the contour more than

1/3 of the fence height. The fence shall be placed such that water cannot runoff around the end of the fence; this may be accomplished by constructing end−returns thatangle up the slope.

J. The silt fence should be limited to handle an area equivalent to 90 square meters (100 sy) per three meters (ten feet) of fence. Caution should be used where the site slope is greater than 1:1 and water flow rates exceed three liters (0.8 gallons) per second per three meters (ten feet) of fence.

2.2 INSPECTION

A. The Contractor shall inspect all temporary silt fences immediately after each rainfall, and at least daily during prolonged rainfall. Any deficiencies shall be immediately corrected by the Contractor.

B. The Contractor shall also make a daily review of the location of silt fences in areas where construction activities have altered the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness. Where deficiencies exist as determined by the Engineer, additional silt fence shall be installed as directed by the Engineer. Damaged or otherwise ineffective silt fences shall be repaired or replaced promptly.

C. Should the filter fence fabric decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, the fabric shall be replaced promptly.

D. Sediment deposits shall either be removed when the deposit reaches one third the height of the fence, or a second silt fence shall be installed as directed by the Engineer.

2.3 REMOVAL

A. The silt fence shall remain in place for the complete duration of the project as necessary to conform to the Project Permit(s) and SWPPP, or until the Engineer directs it be removed. Upon removal, the Contractor shall remove and dispose of any excess sediment accumulations, use hand tools to grade disturbed areas to drain in the pre−disturbance direction, and revegetate all bare areas in accordance with contract requirements. Trimming the silt fence fabric and leaving it in place will not be allowed.

B. Removed silt fence may be used at other locations provided the silt fence fabric and other material requirements continue to be met to the satisfaction of the Engineer.

C. Ground disturbance caused by the installation and removal of the temporary silt fence shall be backfilled and repaired in conformance with the provisions in Section 15−1.02, “Preservation of Property,” of the Standard Specifications.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Temporary silt fence will not be separately measured for payment.

3.2 PAYMENT

A. No separate payment will be made for temporary silt fence. Full compensation for all costs associated with this work shall be considered as included in prices paid for the various

contract items of work involved, and no additional compensation will be allowed.

END OF SECTION

SECTION 015723:
STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IMPLEMENTATION

SECTION 015723:
STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IMPLEMENTATION

1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of implementation of the approved Storm Water Pollution Prevention Plan (SWPPP), as specified in the SWPPP, as specified in this Section, and in compliance with the requirements of the State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated With Construction and Land Disturbance Activities, Water Quality Order No. 2009-0009-DWQ, General Permit No. CAS000002, adopted September 2, 2009, and associated amendments (hereafter Construction General Permit (CGP).

B. The project is currently specified as a Risk Level (TBD, either 2 or 3), based on a completion date of earlier than October 23rd. Attention is directed to Attachments D and E of the CGP, which identify monitoring and reporting requirements for Risk Levels 2 and 3. Risk Level 2 projects are required to meet the reporting and monitoring requirements of Risk Level 1 projects (Attachment C) in addition to those requirements for Risk Level 2 Projects (Attachment D).

C. The Contractor shall be responsible for penalties assessed on the Contractor or the Owner as a result of the Contractor's failure to comply with the provisions in the Construction General Permit or with the applicable provisions of the Federal, State, and local regulations and requirements. Penalties as used in this section shall include fines, penalties, and damages, whether proposed, assessed, or levied against the Owner or the Contractor, including those levied under the Federal Clean Water Act and the State Porter- Cologne Water Quality Control Act, by governmental agencies or as a result of citizen suits. Penalties shall also include payments made or costs incurred in settlement for alleged violations of applicable laws, regulations, or requirements. Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations.

D. The Contractor shall perform the role of Qualified SWPPP Practitioner (QSP), as outlined in the SWPPP.

E. The Owner or their designated representative will perform the role of Qualified SWPPP Developer (QSD). Where referenced in this Section, the words “Engineer” and “QSD” are synonymous.

F. Nothing in the terms of the Contract nor in these Technical Specifications shall relieve the Contractor of the responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.

G. All areas of exposed earth created by the Contractor, beyond what is shown on the Drawings, and referred to in the Technical Specifications or the SWPPP, shall also be subject to the provisions of this Section, except that the Contractor shall be fully responsible for all additional costs and liabilities associated with SWPPP Implementation in these areas.

H. The SWPPP will be periodically amended by the QSD to reflect current site conditions. The Owner will not be liable to the Contractor for Contractor’s failure to accept all or any

portion of an amended or revised SWPPP program, nor for any delays to the Work due to the Contractor's failure to implement the amended SWPPP.

I. The measures outlined in the SWPPP reflect the minimum requirements of the CGP. The Contractor is responsible to perform all additional work, beyond what is shown on the Drawings or the approved SWPPP at the time the contract is awarded, as necessary to meet changing or unforeseen site conditions and to comply with the CGP, at no additional cost to the Owner.

1.2 RELATED SECTIONS

015000 MOBILIZATION
015713 TEMPORARY EROSION CONTROL

1.3 REFERENCE STANDARDS

A. State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ, NPDES General Permit No. CAS000002, Storm Water Discharges Associated With Construction and Land Disturbance Activities, September 2, 2009 as modified on November 16, 2010, and associated amendments, hereafter Construction General Permit (CGP).

B. The California Stormwater Quality Association (CASQA) "Stormwater Best Management Practice Handbook Portal: Construction" including Appendix B, "Storm Water Pollution Prevention Plan Outline" and Appendix D, "Field Monitoring and Analysis Guidance" and addenda thereto issued up to, and including, the date of advertisement of the Project, hereafter referred to respectively as the "Manuals." Copies of the Manuals and the National Pollutant Discharge Elimination System (NPDES) permits may be obtained by accessing the CASQA's Internet Web Site portal at: http://www.cabmphandbooks.com/

C. Approved Project Storm Water Pollution Prevention Plan (SWPPP).

1.4 SUBMITTALS

A. The Engineer's review and approval of Contractor's submittals shall not waive any contract requirements and shall not relieve the Contractor from complying with the CGP, the SWPPP, or Federal, State and local laws, regulations, and requirements.

B. Submit to the Engineer, for review, Manufacturer's product information for materials proposed for use on site for implementation of the SWPPP.

C. The Owner's Representative will submit permit registration documents (PRDs) necessary for coverage under the Construction General Permit (CGP), including but not limited to: the Notice of Intent (NOI), the SWPPP, appropriate fees, and other documents required by the CGP.

D. Prior to start of work, the Contractor shall submit for approval the names and qualifications of qualified staff designated by the Contractor to implement the SWPPP, defined by the CGP as follows:

1. Qualified SWPPP Practitioner (QSP): The Contractor's QSP shall have obtained the required registrations/certifications listed in Section VII of the CGP and successfully completed the SWRCB sponsored or approved QSP training course and QSP exam.
2. If the QSP is no longer employed by the Contractor or is no longer associated with the Work, the Contractor shall notify the Owner's Representative within 24 hours,

designate a replacement within 48 hours, and update the Storm Water Multi-Application & Reporting System (SMARTS) within 72 hours. The replacement QSP shall have the required QSP registrations/certifications listed herein.

E. Submit to the Engineer, completed authorization form with name of proposed Data Submitters, to obtain approval by the Owner's Representative, acting as the legally responsible party (LRP), to upload data electronically into SMARTS. The quarterly inspection reports, Annual Reports, and all sampling results shall be uploaded onto SMARTS by the QSP or designated Data Submitter, following Owner Representative's review and approval.

F. QSP shall prepare an Annual Report summarizing corrective actions, lab reports, sampling and analyses, and any corrective actions not implemented as per Section XVI of the Construction General Permit covering each yearly period in accordance with the permit conditions. QSP shall upload the Annual Report to SMARTS by August 15th, or within one week of final site stabilization, and shall immediately notify the QSD and LRP of upload. LRP or their designated representative shall review and provide comments within one week of upload to SMARTS. QSP shall address comments and revise report as necessary, prior to August 27th, to allow LRP's final review and acceptance prior to Sept. 1st deadline.

G. The SWPPP shall contain a detailed schedule of anticipated construction activities. The QSP shall update the schedule monthly or as directed by the Engineer, and shall submit updates to the QSD for incorporation into the amended SWPPP.

H. The SWPPP shall be amended by the QSD in accordance with the Construction General Permit, such as whenever there is a proposed field modification which may affect the site drainage patterns or potential discharge of pollutants to surface waters, groundwater, or a municipal separate storm sewer system (MS4). The changes shall be recorded by amending the SWPPP in accordance with the regulatory provisions for SWPPP amendment. The SWPPP shall also be amended to incorporate new measures whenever existing measures are deemed ineffective by the QSP, the QSD or regulatory agency inspectors. SWPPP amendments shall be performed and submitted to SMARTS by the QSD. The Contractor's designated QSP shall submit written notification of field modifications to the QSD for his use in amending the SWPPP, within 48 hours of their implementation.

I. If directed by the Engineer or requested in writing by the Contractor and approved by the Engineer, changes to the pollution control measures specified in the SWPPP will be allowed, provided they comply with the CGP. The Contractor's designated QSP shall submit written documentation of these changes to the QSD for amendments to the SWPPP, within 48 hours of their implementation.

J. The QSP shall perform all sampling and analyses required by the CGP and the SWPPP. QSP shall sample runoff regardless of whether the total rainfall exceeds the CGP qualifying rain event (QRE), but only needs to report the readings taken during a QRE. Sampling and testing of water quality (discharges) shall be performed in accordance with sampling and analysis requirements of the CGP. In the event of exceedance, as defined in CGP Section V, QSP shall immediately notify the QSD, and initiate corrective action. Documentation of such an event shall be submitted to QSD in writing within 24 hours. Exceedance reporting forms can be found in Appendix G of the SWPPP.

K. For potential violations of the NPDES permits, Contractor shall notify the Owner's Representative and initiate corrective action, documenting activity as required by law.

L. The Contractor shall keep a copy of the approved SWPPP at the job site. The SWPPP shall

be made available when requested by a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency, or the local storm water management agency. Requests from the public shall be directed to the Engineer.

M. Contractor shall notify the QSD of any RWQCB inspections within 24 hours of the inspection. The Contractor shall submit written notification to the QSD of any findings by the RWQCB, including verbal warnings.

N. Contractor shall provide all information required to complete the SWPPP within 15 calendar days of when the contract is approved or prior to the issuance of the notice to proceed (whichever is sooner). This information shall include, but not be limited to, the following:

1. List of subcontractors and material suppliers, SWPPP Section 300.7
2. Construction schedule, SWPPP Section 500.6
3. Identify Data Submitters, SWPPP Appendix D

O. After project initiation, as per the scheduling or deadlines outlined in the SWPPP, the Contractor shall submit to the Owner's Representative all data, reports, and other information required to fulfill the requirements of the SWPPP, which will include but not be limited to, the following:

1. Verification that rain gauge has been installed, Section 700.5.2
2. CSMP Weather Reports, Section 700.6.4
3. Contractor personnel training for inspectors, and samplers, Section 300.8
4. Rain Event Action Plan (prior to predicted storm event), Section 600.3
5. NAL Exceedance notification to QSD and Approved Signatory and submit to SMARTS within 10 days of conclusion of storm event, Section 700.3.3
6. NAL Exceedance report (if required by Regional Board), Section 900.3
7. Non Compliance Report (if required), Appendix A
8. Annual Report Section 900.2

P. Upon request, the Contractor shall provide copies of all inspection reports for the project to the Owner's Representative within 24 hours of such request.

1.5 PRODUCTS – NOT USED

1.6 QUALITY ASSURANCE

A. Comply with all applicable permits, laws, and the approved SWPPP.

2 EXECUTION

2.1 GENERAL

A. Contractor shall not begin site disturbing activities until the SWPPP has been approved for use, uploaded to SMARTS and a Waste Discharge Identification (WDID) Number received.

B. Implementation of SWPPP measures shall be the first order of business upon site mobilization.

C. The Contractor shall exercise every reasonable precaution to protect the watercourses within the Project area from pollution, including fuels, garbage, oils, chemicals, and other

harmful materials, and shall conduct and schedule the operations so as to avoid introduction of these materials into the watercourses, in accordance with the CGP. Contractor shall coordinate water pollution control work with all other Work done on the Contract.

D. The Contractor's designated QSP shall be:
   1. Responsible for implementation, repair, upgrades, or maintenance of pollution control measures.
   2. Responsible for sampling, monitoring, reporting, and record keeping, as outlined in the SWPPP.
   3. Responsible for preparation of Rain Event Action Plans (REAPs)
   4. Responsible for turbidity and pH testing.
   5. The primary contact for pollution control work.
   6. Have authority to mobilize crews to make immediate repairs to pollution control measures.

E. If the QSD or QSP identifies a deficiency in any aspect of the implementation of the approved SWPPP or amendments, the deficiency shall be corrected immediately (within 72 hours of identification). The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the QSD in writing, but not later than the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation, the Project shall be in noncompliance. Attention is directed to the Contract Documents for possible noncompliance penalties.

F. The Contractor shall be responsible for notifying QSD, and conducting emergency response and cleanup in the event contaminated water reaches onsite catch basins, offsite catch basins, ditches, or creeks. All response measures shall be documented, and shall be inspected for effectiveness and maintained in good working order. Ineffective measures shall be repaired or replaced immediately at Contractor's cost and schedule expense.

G. The weather forecast for the appropriate project's zip code shall be monitored and used by the Contractor on a daily basis. If there is any chance of rain forecast within 48 hours, the forecast shall be printed out and kept with the SWPPP. If the chance of precipitation is predicted to be greater than 50 percent, the necessary water pollution control practices shall be deployed prior to the onset of the precipitation, and monitoring shall increase, as required by law and outlined in the Construction General Permit. For Risk Level II and III locations within the project, a Rainfall Event Action Plan (REAP) shall be prepared as required by the SWPPP. The REAP shall be provided to the QSD within 72 hours of completion.

H. The National Weather Service weather forecast is found at:http://www.wrh.noaa.gov/mtr/

I. The Contractor shall maintain a rain gage at the site at all times during construction. Rain gage readings shall be recorded daily and provided to the State Representative within 72 hours whenever the daily rainfall total is greater than 0.25 inches per day or whenever the rainfall is a part of a qualifying storm event as defined by the CGP.

J. The Owner will not be responsible for delays caused by the Contractor's failure to conform to the approved SWPPP, this Section, or the CGP. The Owner's Representative may order the suspension of construction operations which create or have the potential to create water pollution, at the sole expense of the Contractor.

K. The Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the State Specifications.

2.2 BEST MANAGEMENT PRACTICES (BMP'S)

A. Contractor shall furnish sufficient personnel, materials and adequate equipment to perform the water pollution control maintenance work immediately and to work continuously until its completion. Water pollution control maintenance work shall consist of maintaining and replacing temporary water pollution control measures throughout the duration of the Contract until permanent stabilization measures are accepted by the Owner. Maintenance work and SWPPP shall be considered as integral functional practices to implement water pollution control.

B. If the measures being taken by the Contractor are inadequate to control water pollution effectively, the Owner's Representative may direct the Contractor to revise its operations and its SWPPP program. Such directions will be in writing and will specify the items of Work for which the Contractor's water pollution control measures are inadequate. No further Work shall be performed on said items until the water pollution control measures are adequate.

C. Contractor shall be responsible throughout the duration of the Project for installing, constructing, inspecting, maintaining, removing and disposing of the water pollution control practices included in the SWPPP, the Drawings, the Technical Specifications, and any amendments thereto. Unless otherwise directed by the Engineer, the Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of Work ordered in conformance with the Contract Provisions. Requirements for installation, inspection, maintenance, removal, and disposal of water pollution control practices are specified in the Drawings, the SWPPP, the Manuals, and herein.

D. Implementation of pollution control measures (BMPs) shall conform to the Drawings, the SWPPP, the CGP conditions, and these Specifications.

E. Implementation of water pollution control practices may vary by season. The SWPPP, this Section, and the Manuals shall be followed for control practice selection of year round, rainy season and non-rainy season water pollution control practices.

F. Disturbed soil areas shall be considered active whenever the soil disturbing activities have occurred, continue to occur or will occur during the ensuing 14 days. Non-active areas shall be protected as required within 14 days of cessation of soil disturbing activities or prior to the onset of precipitation, whichever occurs first.

G. Contractor may be directed to apply permanent erosion control in small or multiple units as disturbed soil areas are deemed substantially complete by the QSD.

H. Temporary and permanent BMP's shown on the Drawings represent a mandatory minimum level of treatment. Contractor shall be responsible for these BMP's in addition to all others required by the SWPPP, the CGP or as directed by the Engineer.

2.3 MAINTENANCE, INSPECTION AND REPAIR

A. For all project Risk Levels, the QSP, or an approved substitute designated and trained by the QSP (QSP- designee) shall inspect the site before a forecast storm (within 48 hours prior to a forecast storm), during the storm (at required intervals during extended rains), and after a

storm (not later than 48 hours after rain event). Inspections shall be documented as specified in the SWPPP. Inspection forms shall be provided to the Owner's Representative within 72 hours of a request from the State Representative.

B. Stormwater inspections shall be performed at all active areas and all areas with installed BMPs as required by permit and the SWPPP, and on a minimum weekly basis, year-round by the QSP or individual trained by the QSP. More frequent monitoring is required for rain events.

C. Non-Stormwater inspections shall be performed quarterly by the QSP or QSP-designee (quarterly inspection time periods are January-March, April-June, July-September, and October-December).

D. The QSP or QSP-designee shall conduct all inspections, sampling and analyses, as required by the CGP and the SWPPP, at all active areas and all areas with installed BMPs.

E. If the Contractor or the Owner's Representative identifies a deficiency in any aspect of the implementation of the approved SWPPP or amendments, the deficiency shall be corrected immediately (within 72 hours of identification). The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the Owner's Representative in writing, but not later than the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation, the Project shall be in noncompliance.

F. Contractor shall provide Water Pollution Control training as required by the CGP. Documentation of training shall be provided to the Owner's Representative within one week of the training.

G. The QSP shall inspect the pollution control measures to identify their effectiveness and implement repairs as required by the SWRCB.

H. Contractor shall furnish sufficient personnel, materials and adequate equipment to perform the water pollution control maintenance work immediately and to work continuously until its completion. Water pollution control maintenance work shall consist of maintaining and replacing temporary water pollution control measures throughout the duration of the Contract until permanent measures are accepted by the Owner's Representative. Maintenance work and SWPPP shall be considered as integral functional practices to implement water pollution control. Failure to fully comply with the requirements of the Construction General Permit shall subject the Contractor to all fines, damages and job delays incurred due to failure to implement and properly update the SWPPP.

I. If the measures being taken by the Contractor are inadequate to control water pollution effectively, the Owner's Representative may direct the Contractor to revise its operations and its SWPPP program. Such directions will be in writing and will specify the items of Work for which the Contractor's water pollution control measures are inadequate. No further Work shall be performed on said items until the water pollution control measures are adequate and, if also required, a revised SWPPP program has been accepted.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. SWPPP Implementation will not be separately measured for payment.

3.2 PAYMENT

A. No separate payment will be made for SWPPP Implementation. Full compensation for all costs associated with this work shall be included in the contract price Mobilization and Demobilization in accordance with Section 015000.

END OF SECTION

SECTION 017123.16
CONSTRUCTION SURVEYING

SECTION 017123.16
CONSTRUCTION SURVEYING

1 GENERAL

1.1 DESCRIPTION

A. The work required under this Section shall include, but is not limited to, all labor, tools, materials, equipment and incidentals required to perform construction surveying necessary to establish the lines and grades of the proposed work, as shown on the Drawings, as specified, or as directed by the ENGINEER.

B. The CONTRACTOR shall provide all surveying and grade-setting required to construct the project.

1.2 WORK INCLUDED

A. The CONTRACTOR shall preserve and protect all project survey control and reference points shown on the Drawings and located outside the limits of disturbance. Monuments disturbed by the CONTRACTOR shall be reestablished by the CONTRACTOR at his sole expense.

B. The CONTRACTOR shall be solely responsible for the protection and maintenance of all existing and CONTRACTOR-established survey marks and monuments, and all constructed lines and grades.

1.3 RELATED SECTIONS

311100 CLEARING AND GRUBBING
312316 STRIPPING AND EXCAVATION
312323 ENGINEERED FILL
334100 STORM DRAINAGE SYSTEMS - CULVERTS

1.4 REFERENCE STANDARDS

A. State of California, Department of Transportation (CALTRANS) State Standard of Specifications (current edition).

1.5 SUBMITTALS – NOT USED

1.6 MATERIALS – NOT USED

1.7 QUALITY ASSURANCE

A. All Work shall be performed to the satisfaction of the ENGINEER.

B. The ENGINEER may, at his sole discretion, perform his own surveys for: verification of project control points, verification of lines and grades, and inspection of survey monument preservation. CONTRACTOR shall provide unrestricted access for the ENGINEER to spot-check the work. This does not relieve the CONTRACTOR of their responsibility to perform additional independent surveying, as need to complete the work.

C. In the event that the construction staking reveals a design inconsistency or error, CONTRACTOR shall notify the ENGINEER immediately and shall not proceed with the work until directed by the ENGINEER.

2 EXECUTION

2.1 DESCRIPTION

A. The CONTRACTOR'S Surveyor will be provided with the northing, easting and elevation of the control points existing in the field as shown on the drawings.

B. From this information, the CONTRACTOR shall establish the baseline control points and reference points for horizontal and vertical control and make all additional detailed surveys and measurements and establish markings or monuments necessary for the construction of the work as dimensioned on the Drawings. All stakes and survey markers will be conspicuously marked with flagging tape or paint by the CONTRACTOR.

C. The CONTRACTOR will be responsible for the accuracy of all layout work and, if necessary, will retain the services of a licensed surveyor or civil engineer to set elevations, lines and grades for all construction. CONTRACTOR shall be responsible for grade staking, and conformance of finish grades to those shown on the Drawings

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Construction Surveying shall not be independently measured for payment.

3.2 PAYMENT

A. No separate payment will be made for the work covered under this section. Full compensation for all costs in connection with Construction Surveying shall be included in the contract price for related work.

B. The cost of resetting and verifying control points disturbed by the CONTRACTOR will be borne by the CONTRACTOR. The cost of any such verification or replacement of bench marks and/or control survey points will be deducted from any monies due to the CONTRACTOR. The CONTRACTOR will not be allowed any adjustment in working days for such verification or replacement of survey control points.

END OF SECTION

SECTION 311100
CLEARING AND GRUBBING

SECTION 311100
CLEARING AND GRUBBING

1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of furnishing all labor, equipment, and materials necessary to perform the clearing and grubbing, the removal or disposal of all cleared and grubbed materials, and the filling of all grubbing holes, as specified, as shown on the Drawings, or as directed by the ENGINEER.

1.2 RELATED SECTIONS

015000	MOBILIZATION
312316	STRIPPING AND EXCAVATION
312323	ENGINEERED FILL

1.3 REFERENCE STANDARDS

A. State of California, Department of Transportation (CALTRANS) State Standard Specifications, current edition.

1.4 SUBMITTALS - NOT USED

1.5 MATERIALS - NOT USED

1.6 QUALITY ASSURANCE - NOT USED

2 EXECUTION

2.1 CLEARING AND GRUBBING

A. CLEARING AND GRUBBING

1. Within the limits of clearing and grubbing, the ground shall be cleared and grubbed to a depth necessary to removal all trees, stumps, roots, down timber, snags, vegetation, logs, buried logs, old piling, stone, concrete rubble, and other objectionable debris, unless otherwise shown on the Drawings or directed by the ENGINEER.
2. All trees within the area designated for clearing and grubbing on the Drawings shall be removed. Trees identified for removal on the Drawings are approximate and additional unmapped trees may be present. Contractor shall be responsible for the removal of all trees whether identified on the Drawings or not.
3. Stumps shall be removed to minimum depth of 4 feet, or to a point where remaining roots are less than 1.5 inches in diameter, whichever depth is greater.

B. CLEARING ONLY

1. In areas where grubbing is not required, the clearing operations shall consist of the complete removal of all obstructions above the ground surface, including all trees, down timber, snags, vegetation, logs, old piling, stone, concrete rubble, and other objectionable debris, unless otherwise shown on the Drawings or directed by the ENGINEER.

2. All stumps shall be cut flush with the ground surface.
3. All trees within the area designated for clearing only on the Drawings shall be removed. Trees identified for removal on the Drawings are approximate and additional unmapped trees may be present. Contractor shall be responsible for the removal of all trees whether identified on the Drawings or not.

C. TREE REMOVAL

1. CONTRACTOR shall flag all trees to be removed for approval by OWNER Representative prior to its removal. Once the flagging is completed, OWNER Representative will walk the vegetation removal areas and approve them prior to CONTRACTOR initiating clearing and grubbing activities.
2. Trees shall be felled in such a manner as to avoid damage to trees left standing, to the existing structures and installations, as well as with due regard for the safety of employees and others.
3. Trees located beyond the limits for clearing and grubbing that are not marked for removal, shall be protected from damage, as indicated on the Drawings and as specified.
4. Downed plant materials shall be removed from tree protection zones and protected natural resource areas by hand or with equipment located outside fencing. CONTRACTOR shall extract debris by lifting the material out, not skidding it across the soil surface.

D. Except as specified or otherwise indicated on the Drawings, all logs, brush, strippings, slash, and other organic debris which are the products of the clearing and grubbing operations shall be disposed of on site at locations to be approved by the ENGINEER.

2.2 DISPOSAL OF DEBRIS

A. Cleared and Grubbed Materials. Except as hereinafter specified or otherwise indicated on the Drawings, all logs, brush, strippings, slash, and other organic debris which are the products of the clearing and grubbing operations shall be disposed of on site at locations to be approved by the ENGINEER. All garbage, concrete, piping, or other non- organic materials shall be disposed off-site by the CONTRACTOR at locations to be arranged and paid for by the CONTRACTOR.

B. Clean woody plant material products of the clearing and grubbing operations not designated for salvage may be chipped and disposed of on site at the location shown on the Drawings, used as mulch, or as specified by the ENGINEER.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Clearing and Grubbing

1. Clearing and Grubbing will be measured as Lump Sum shown on drawings. This includes all work necessary to clear and grub the prescribed area and the disposal of debris as specified.

B. Clearing Only

1. Clearing Only will be measured by Lump Sum as shown on drawings. This includes all

work necessary to clear the prescribed area and the disposal of debris as specified.

C. No separate payment will be made for clearing incidental to the work. All costs in connection with this work will be considered incidental to the cost of construction of the associated improvement.

3.2 PAYMENT

A. Payment will be made under:

Pay Item	Pay Unit
Clearing and Grubbing	Lump Sum
Clearing Only	Lump Sum

END OF SECTION

SECTION 312200
ROAD GRADING

SECTION 312200
ROAD GRADING

1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of furnishing all labor, equipment, materials, and performing all operations necessary to complete road grading, as specified, as shown on the Drawings, or as directed by the ENGINEER. Work includes, but is not limited to the following:

1. Stripping for removal of vegetation and surface organics.
2. Road Surfacing or recontouring
3. Drainage dip (Reverse Grade Dips, Knicks, and Knockouts)
4. Ditches

1.2 REFERENCES

A. State of California, Department of Transportation (CALTRANS) State Standard Specifications (current edition).

1.3 QUALITY ASSURANCE

A. Comply with all applicable permits and regulations.

2 EXECUTION

2.1 GENERAL

A. The CONTRACTOR shall protect existing utilities in performing any grading work.

B. The CONTRACTOR shall comply with all permit conditions in performing any grading work.

2.2 ROAD DRAINAGE FEATURES

A. Reverse grade dips, knicks, knockouts, and waterbars shall be constructed as specified on Drawings, or as directed by the ENGINEER.

B. Rolling dips may be constructed using approved onsite or imported engineered fill.

C. Moisture condition the fill as required to achieve specified compaction.

2.3 ROAD SHAPING

A. General. The road prism shall be reshaped to drain to ditches, dips and culverts and conform to the typical sections shown on the Drawings, or as directed by the ENGINEER. Generally, this work will consist of ripping and or blading the surface to remove high points and ruts or rills and then compacting prior to placement of aggregate base.

B. Road shaping includes removal and local disposal of debris accumulations at the toe of cut slopes or on road shoulders that would otherwise encroach into the road section or inboard shoulder. Final grades shall be subject to the approval of the ENGINEER.

C. Where Road Shaping requires additional effort, such as excavation and offhaul of material to change the profile grade, this work has been identified on the drawings.

2.4 STRIPPING

A. Stripping. Strip surfaces of road prism, excavations and fill foundations of heavy growth of crops, grass, weeds and other vegetation as specified in Section 311100, Clearing and Grubbing. Greater depths of stripping may be necessary in selected areas to remove vegetation, as determined by the ENGINEER.

B. Unless otherwise specified, the stripped materials shall be dispersed on-site, at locations to be identified by the ENGINEER.

2.5 DELETERIOUS SPOILS

A. Separate clean excavated soils from deleterious soils and stumps and vegetation.

B. Deleterious soils including topsoil, fat clay soils, organic rich soils, decayed woody debris rich soils, and other material, as identified by the ENGINEER, shall be disposed at an approved stable location as directed by the ENGINEER or District representative.

C. Areas to receive fill shall be cleared of vegetation and ripped to a depth of 6 inches.

D. Spoils generated from grading shall be placed a maximum of 3 feet deep with an embankment face inclined no steeper than 3:1 (35%) unless otherwise directed or specified.

E. The CONTRACTOR shall be responsible for conforming to existing surrounding conditions with smooth transition in grading, and shall avoid any abrupt apparent changes in grades or cross slopes, low spots or hazardous conditions.

F. Spoils shall not be placed in locations with the potential to interrupt or receive concentrated flow.

G. Apply erosion control measures at spoils locations, as specified or as directed by the ENGINEER.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Stripping. Stripping will not be separately measured for payment.

B. Reshape Road. Reshape (inslope/outslope) road, removal of ruts, and backfilling of potholes will not be separately measured for payment. This work is to be considered incidental to installation of drainage dips and placement of road aggregate.

C. Drainage dips: New, reconstructed or cleaned drainage dips (rolling dips, knicks, waterbars, knockouts) will be measured by unit as shown on the Drawings. Reestablishment of existing dips damaged during operations will not be separately measured for payment.

D. Inboard ditch: New, reconstructed or cleaned road ditches will be measured by unit as shown on the Drawings

E. Ditch Relief Culverts: New, replaced or cleaned ditch relief culverts will be measured per section 334100: Storm Drain Systems

F. Rock Aggregate: Rock Aggregate will be measured for payment per 321540 Rock Aggregate

G. Other miscellaneous grading. All other grading for road drainage improvements will not be measured for payment.

H. Surveys: Construction staking will not be separately measured for payment.

3.2 PAYMENT

A. Regrade/shape Road. Reshape Road will be paid for at the contract unit price per linear foot, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to complete the reshape road as specified, including all handling of materials, and disposal of unsuitable materials.

B. Drainage dips: Drainage dips (rolling dips, knicks, waterbars, knockouts) will be paid for at the contract unit price per each, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to complete the reshape road as specified, including all handling of materials, and disposal of unsuitable materials.

C. Inboard ditch: Inboard road ditches will be paid for at the contract unit price per each, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to complete the work as specified, including all handling of materials, and disposal of unsuitable materials.

D. No separate payment will be made for other miscellaneous grading incidental to the work. All costs in connection with this work will be considered incidental to the cost of construction of associated improvement.

E. Payment will be made under:

Pay Item	**Pay Unit**
Reverse Grade Dip (Clean, reconstruct, new)	EACH
Knick (Clean, reconstruct)	EACH
Knockout (Clean, new)	EACH
Waterbar	EACH
Ditch relief culvert (clean)	EACH
Inboard ditch (clean/new)	LF

END OF SECTION

SECTIONS 312300
EXCAVATION AND FILL

SECTIONS 312300
EXCAVATION AND FILL

1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of furnishing all labor, equipment, materials, and performing all operations necessary to complete to complete all earthwork as specified in the geotechnical report, as shown on the Drawings, and as directed by the ENGINEER. Work includes, but is not limited to the following:

1. Site Clearing
2. Stripping for removal of vegetation and surface organics.
3. Excavation for removal of all materials, regardless of character and subsurface conditions for construction of earthen embankments, trenches for culverts, drainage dips and ditches, temporary access routes, stockpile areas, and other areas shown on the Drawings, specified or as directed by the ENGINEER.
4. Separation, salvage, loading, on−site hauling, and stockpiling of excavated materials
5. Subgrade preparation
6. Processing, placement and compaction of engineered fill
7. Disposal of surplus and unsuitable material as compacted Non-Structural Fill
8. Construction of ramps, and other incidental earthwork incidental to the construction of the improvements.

B. If suspected contaminated soil is encountered in the work area beyond that mentioned in the contract documents, immediately stop all work in the area of the suspected contamination and notify the ENGINEER. Contaminated soil is soil that produces fuel or chemical odors, produces an oil sheen on the surface of water, has staining, contains debris or other visible indicators, or soil designated by the Port as contaminated. The OWNER will characterize contaminated soil, obtain profile for disposal, and determine the location of disposal.

C. All grading shall comply with Section 19 of CALTRANS Standard Specifications, and with the recommendations of the Geotechnical Investigation. Prior to beginning work, the CONTRACTOR shall be familiar with the geotechnical investigation. In the event of discrepancy between the report and the notes herein, the report shall prevail. It shall be the responsibility of the CONTRACTOR to visit the site and make his own interpretations with regard to materials, methods and equipment necessary to perform the work required for this project.

D. Temporary erosion control and BMP's shall be installed and approved by the ENGINEER prior to beginning earthwork.

E. The CONTRACTOR is responsible to locate, identify, and protect all existing utilities from damage.

F. After the earthwork operations have been completed and the GEOTECHNICAL ENGINEER has finished his observation of the work, no further earthwork operations shall be performed except with the approval of and under the observation of the GEOTECHNICAL ENGINEER.

G. The proposed project will require significant grading. The GEOTECHNICAL ENGINEER shall be notified **at least four (4) working days prior to any grading or foundation excavating** so the work in the field can be coordinated with the grading CONTRACTOR and arrangements for testing and observation can be made. The recommendations and specifications outlined here are based on the assumption that the GEOTECHNICAL ENGINEER will perform the required testing and observation during grading and construction. It is the owner's responsibility to make the necessary arrangements for these required services.

1.2 RELATED SECTIONS

015000	MOBILIZATION
015713	EROSION CONTROL
015723	SWPPP IMPLEMENTATION
017123.16	CONSTRUCTION SURVEYING
311100	CLEARING AND GRUBBING
334100	STORM DRAINAGE SYSTEMS – CULVERTS

1.3 REFERENCE STANDARDS

A. State of California, Department of Transportation (CALTRANS) State Standard Specifications (current edition).

B. ASTM: American Society for Testing and Materials

1. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3
2. ASTM D6938: Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

C. Geotechnical Engineering Investigation by:

Haro, Kasunich and Associates
116 East Lake Ave
Watsonville, Ca 95076
(831) 722-4175

1.4 SUBMITTALS – NOT USED

1.5 MATERIALS

A. Engineered Fill

1. Engineered fill is select soil to be used to reconstruct the structural fill embankment of the crossing.
2. Material to be used as engineered fill shall consist of natural or artificially graded non–organic granular soil that is relatively free of organic material and contain no rocks or clods greater than 6 inches in diameter, with no more than 15 percent larger than 4 inches. The material should be predominately granular with a plasticity index less than 18, a liquid limit less than 35, and not more than 20 percent passing the #200 sieve.
3. To the extent they are needed, all suitable materials from the specified on-site excavations shall be used in the construction of required permanent engineered fill. The suitability of materials for specific purposes will be subject solely to the approval of the ENGINEER, as outlined in the geotechnical report, and in conformance with these specifications.

A. Non-Structural Fill Material

1. Non-Structural Fill is surplus, deterious and/or organic rich earth materials derived from the excavation of the crossing and which is not to be used as engineered fill to reconstruct the crossing. This material will be designated as waste and disposed onsite in a stable configuration.
2. Non-Structural Fill Material includes but is not limited to
   a) Surplus fill not used as engineered fill
   b) Material excavated from the site determined not usable as engineered fill or topsoil.
   c) Material that does not meet the requirements specified for engineered fill material.
   d) Material that is contaminated or otherwise determined by the ENGINEER to be unsuitable for reuse as engineered fill.

B. Logs and other debris
   1. Roots, logs, and other material containing excessive amounts of woody or organic rich debris.

C. If a disagreement between the CONTRACTOR and the ENGINEER occurs over the suitability of materials, the CONTRACTOR shall perform laboratory testing to demonstrate compliance with the specifications. The failure of the CONTRACTOR to perform the testing shall not relieve the CONTRACTOR from the obligation to provide suitable materials.

1.6 QUALITY ASSURANCE

A. Conduct preconstruction meeting at Project site with the CONTRACTOR, ENGINEER and GEOTECHNICAL ENGINEER.

B. All grading activities shall comply with the requirements of the Geotechnical Engineering Report prepared by Haro, Kasunich and Associates, dated July 2017. The Geotechnical Engineering Report shall govern all grading activities.

C. Comply with all applicable permits and regulations.

D. CONTRACTOR shall provide necessary construction staking and references points, as required to meet the specified tolerances for the work.

2 EXECUTION

2.1 GENERAL

A. No excavation shall be started until the CONTRACTOR has staked out the proposed work.

B. The CONTRACTOR shall protect existing utilities in performing any excavation work.

C. The CONTRACTOR shall comply with all permit conditions in performing any excavation work.

D. The CONTRACTOR will be responsible for the accuracy of all layout work and, if necessary, will retain the services of a licensed surveyor or civil engineer to set elevations, lines and grades for all construction. CONTRACTOR shall be responsible for grade staking, and conformance of finish grades to those shown on the plans.

E. CONTRACTOR shall perform an independent earthwork estimate for the purpose of preparing bid prices for earthwork. Quantities indicated on the Drawings are approximate estimates provided only for permitting purposes and are not suitable for bidding purposes.

F. IN THE EVENT THAT ANY UNUSUAL CONDITIONS NOT COVERED BY THE DRAWINGS AND SPECIFICATIONS ARE ENCOUNTERED DURING EXCAVATION OPERATION, THE ENGINEER SHALL BE IMMEDIATELY CONTACTED FOR DIRECTIONS. IT SHALL BE THE CONTRACTOR'S

RESPONSIBILITY TO IMMEDIATELY NOTIFY THE ENGINEER UPON DISCOVERY OF ANY CONFLICTS BETWEEN DRAWINGS AND FIELD CONDITIONS.

G. CONTRACTOR shall apply appropriate erosion control measures, such as silt fences, to prevent soil and rock that has been excavated or otherwise dislodged by trail work from traveling downslope (raveling, sliding, sloughing, etc.) with the potential to enter a watercourse.

2.2 STRIPPING

A. Stripping. Strip surfaces of trail prism, excavations and fill foundations of trees, stumps, logs and other objectionable material as specified in Section 311100, Clearing and Grubbing. Greater depths of stripping may be necessary in selected areas to remove vegetation, as determined by the ENGINEER.

2.3 EXCAVATION

A. General. Excavation shall consist of the excavation, transport and removal of all material for embankment foundation preparation, mass excavation and finish grading, and other miscellaneous excavations. Excavation includes but not limited to the removal of "clean" fill material to be reused as engineered fill, unclassified and deleterious fill, crib logs, stumps, and other debris.

B. Excavation Limits

1. The crossing shall be excavated to native channel grade, width and orientation, and/or as directed by the ENGINEER. Approximate depth, lines, and grades of excavation are shown on the Drawings.
2. Excavations shall extend into firm, undisturbed native soils as outlined in the geotechnical report. In the event that organic materials, yielding sub−grade (pumping) or other deleterious materials are encountered during foundation excavations, they shall be removed as directed by the ENGINEER.

C. Backslopes

1. General
   a) THE CONTRACTOR SHALL INFORM GEOTECHNICAL ENGINEER PRIOR TO ANY EXCAVATION RESULTING IN ANY CUTS GREATER THAN 20 FEET IN HEIGHT AND/OR INCLINED STEEPER THAN 1.5:1 (H:V).
   b) SITE SAFETY:
      i) THE CONTRACTOR IS ADVISED THAT THE PROPOSED TEMPORARY CUT SLOPES ARE COMPOSED OF OLD FILL AND POSSIBLE ORGANIC CONTAMINANTS. A HAZARDOUS CONDITION MAY EXIST FOR CONSTRUCTION WORKERS WORKING BELOW THE PROPOSED TEMPORARY CUT SLOPES IF DELETERIOUS MATERIAL AND LOOSE FILLS ARE ENCOUNTERED DURING EXCAVATION. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING WHATEVER SAFETY PRECAUTIONS HE DEEMS NECESSARY TO MINIMIZE EXPOSED HAZARDS BEFORE AND WHILE COORDINATING WITH THE ENGINEER. FENCING TO PROTECT PARK USERS FROM STEEP EXCAVATIONS SHALL CONFORM TO ALL LOCAL CODES, ORDINANCES, AND OSHA REQUIREMENTS.
2. Rock
   a) Cut slopes in rock shall be inclined no steeper than 0.75:1 (H:V) slope for heights up to 20 feet unless reviewed by the project geotechnical engineer or representative.

b) CUTS INTO ROCK GREATER THAN 20 FEET SHALL BE INSPECTED AND MAY BE APPROVED BY THE GEOTECHNICAL ENGINEER OR REPRESENTATIVE BASED ON SITE REVIEW DURING EXCAVATION.

3. Native colluvial soils and fill
   a) Temporary cuts into firm native soils and fill shall be inclined no steeper than 1:1 (H:V) for heights up to 20 feet unless reviewed by the project geotechnical engineer or representative.
   b) TEMPORARY CUTS INTO NATIVE SOILS AND FILL STEEPER THAN 1:1 AND/OR GREATER THAN 20 FEET IN HEIGHT SHALL BE INSPECTED AND MAY BE APPROVED BY THE GEOTECHNICAL ENGINEER OR REPRESENTATIVE BASED ON SITE REVIEW DURING EXCAVATION.
4. The CONTRACTOR should be aware that slope height, inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state or federal safety regulations, i.e. OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926 Subpart P, or successor regulations. **Cut slopes exceeding minimum standards must be inspected and evaluated by the Geotechnical Engineer or Representative before excavation commences.**

D. Control of Water. Water control shall be performed in accordance with project permit conditions, and Dewatering, Section 312319 of these Specifications. When water is encountered, either ground water or surface runoff, the CONTRACTOR shall furnish, install, maintain, and operate all necessary machinery and equipment required to keep the excavation reasonably free from water, as approved by the ENGINEER, until the placement of backfill material has been completed, inspected, and approved, and all danger of flotation and other damage is removed. Water pumped from the excavation shall be disposed of in such manner as will not cause injury to public or private property, or constitute a nuisance or menace to the public, and the disposal method shall be subject to the approval of the ENGINEER. Water shall be controlled until work is complete.

E. Excess Excavation. Care shall be exercised by the CONTRACTOR not to excavate below the grades shown on the Drawings, except as specified herein, and as directed by the ENGINEER. All excavations in excess of the grades shown on the Drawings which are not directed by the ENGINEER shall be backfilled with compacted embankment at the CONTRACTOR'S expense.

F. Temporary Excavations. With exposure and drying, on−site soils may experience progressive sloughing if excavated near vertical and left un−shored during construction.

2.4 SEPARATION, TRANSPORT AND STOCKPILING OF MATERIALS

A. Excavated materials shall be separated into 1) select material to be reused as engineered fill, 2) surplus, deterious and unsuitable soils to be placed as non-structural fill, and 3) large woody debris. These materials shall be transported and stockpiled separately.

B. Engineered Fill

1. Select soils that in the opinion of the ENGINEER are suitable for reuse as engineered fill are to be transported and temporarily stockpiled separately from all other soils and debris.

C. Surplus and unsuitable soil

1. Surplus, deleterious and unsuitable soils including but not limited to topsoil, fat clay soils, organic rich soils, decayed woody debris rich soils, and other material, as

identified by the ENGINEER, shall be transported and permanently placed as compacted non-structural fill.

D. Large woody debris (logs, stumps and large branches) disposal
   1. Logs, stumps and branches greater than 10 inches in diameter that are not to be reused at the work site for erosion control purposes shall be moved and stockpiled in approved stable locations as shown on Drawings or as specified elsewhere in Specifications, or as directed by the ENGINEER.
   2. Logs, stumps and branches less than 10 inches shall be chipped, moved and either used as mulch for erosion control or in approved stable locations as shown on Drawings or as specified elsewhere in Specifications, or as directed by the ENGINEER.

E. Stockpile
   1. Soils shall be stockpiled in approved locations shown on drawings or as approved by the ENGINEER. Portions of Old Haul Road may be used to temporarily stockpile spoils.
   2. The CONTRACTOR shall avoid contaminating engineered fill material with organic rich debris.
   3. All spoils placed in temporary stockpile areas shall be removed at the end of construction and the ground restored to native condition.

2.5 ENGINEERED FILL

A. In areas to be graded or designated to receive engineered fill, all loose soil, old logs and other unsuitable material must be subexcavated to its full depth in conformance with Section 311100: Clearing and Grubbing. Existing depressions or voids created during site clearing should be backfilled with engineered fill.

B. Engineered fill shall be placed per limits, lines and grades as shown on Drawings and as approved by the ENGINEER.

C. The subgrade shall be scarified at least 6 inches; moisture conditioned and compacted to 80 percent relative compaction.

D. If soft, wet, or pumping subgrade soils are present, the ENGINEER shall provide subgrade stabilization recommendations in the field during grading. Recommendations may include stabilization fabric, overexcavation, or placement of rock.

E. Engineered fill shall be placed in thin lifts not exceeding 8 inches in loose thickness; moisture conditioned, and compacted to a minimum of 90 percent relative compaction per ASTM D 1557, up to desired grade. Fill adjacent to structures, pipe, conduits, and anti−seep collars shall be compacted to a density equivalent to that of the surrounding fill by means of hand tampers or plate vibrators. Hand directed tampers or compactors shall be used on areas not accessible to heavy compaction equipment, fills compacted in this manner shall be placed in layers not greater than 4 inches in thickness before compaction, and shall meet the same density requirement as for the adjacent area.

F. When, in the opinion of the ENGINEER, the surface of any compacted layer is too smooth to bond properly with the succeeding layer, it shall be scarified to a depth of 6 inches before the succeeding layer is placed thereon.

G. During placement and compaction of fill, the moisture content of the materials being placed shall be adjusted and maintained as necessary. The moisture shall be uniformly distributed throughout the layer prior to compaction and shall meet the requirements of the geotechnical report. If the material is not within the required moisture content, the

CONTRACTOR will be required to moisture condition the soil. If the material is too wet for proper compaction or soft and yielding sub−grade is experienced (pumping), the CONTRACTOR will be required to aerate the material to a moisture content within the desired limits prior to compaction. If the top surface of the preceding layer of compacted fill or a subgrade or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond, it shall either be removed or scarified and moistened to an acceptable moisture content prior to placement of the next layer of fill.

H. Keyway and Benches.

1. Fill embankments situated on slopes between 20% or steeper in gradient shall be drained, keyed and benched into sandstone bedrock or firm native material.
2. Keyway and select bench drains shall be composed of Class 2 Caltrans Permeable drain rock, unless otherwise specified on the drawings. The bench drains shall be a minimum of 2 feet wide and extend the full height of the bench or minimum 3 feet (whichever is greater) with a 3 inch diameter perforated PVC pipe (perforations down) placed at the inboard edge of the bench 3 inches from its base. Perforated pipe shall be connected to a 4 inch diameter solid tight line that carries water to the base of the fill slope and discharged in a reasonable and controlled manner at a location to be determined in the field and to the satisfaction of the Engineer.

I. Dressing. Engineered Fill slopes shall be dressed by over−building and cutting back to the required grade. The CONTRACTOR may compact the shoulder of each lift during the placement of fill materials to assist in the subsequent dressing of the slopes.

J. Engineered fill slopes should be inclined no steeper than 1.5:1 (horizontal to vertical) and not greater than 60 feet in height without approval of the ENGINEER. Where shown on plans at the transitions to existing slopes that are steeper gradients, fill slopes may be blended with natural grades.

2.6 NON STRUCTURAL FILL

A. Areas to receive non-structural shall be cleared of vegetation in conformance with Section 311100: Clearing and Grubbing and ripped to a depth of 6 Inches. All Stumps Shall Be Cut Flush With The Ground Surface.

B. Non-structural fill shall be placed per limits, lines and grades as shown on drawings and as approved by the ENGINEER.

C. The non-structural fill shall be shall be placed in maximum 8 inch lifts is loose thickness and compacted to a minimum of 85% of the maximum dry density per ASTM D 1557. The placement surplus and unsuitable soil shall be segregated to the extent practicable and to the satisfaction of the ENGINEER, with the less organic rich soils placed along the base course and the more organic rich material placed in the upper course.

D. Non-structural fill situated on slopes 20% or steeper in gradient shall be keyed and benched into firm material.

E. Non-structural fill greater than 5 feet in thickness shall incorporate a back drain per Drawings and as directed by the ENGINEER.

1. Keyway and select bench drains shall be composed of Class 2 Caltrans Permeable drain rock, unless otherwise specified on the drawings. The bench drains shall be a minimum of 2 feet wide and extend the full height of the bench or minimum 3 feet (whichever is greater) with a 3 inch diameter perforated PVC pipe (perforations down) placed at the

inboard edge of the bench 3 inches from its base. Perforated pipe shall be connected to a 4 inch diameter solid tight line that carries water to the base of the fill slope and discharged in a reasonable and controlled manner at a location to be determined in the field and to the satisfaction of the Engineer.

F. Non-structural fill slopes should be inclined no steeper than 3:1 (horizontal to vertical) and not greater than 60 feet in height without approval of the ENGINEER. Where shown on plans at the transitions to existing slopes that are steeper gradients, fill slopes may be blended with natural grades.

2.7 FINISH

A. The finished grades shall transition naturally into adjacent existing grades to provide a functional and naturalistic finished surface. Due to the complex nature of the project and the desired aesthetic and functional features, not all details can be accurately represented on the Drawings. As a result, the CONTRACTOR may be directed by the ENGINEER to make minor adjustments to finish grades to best achieve these results. These adjustments may include smoothing or rounding conforms, or changing slope angles or daylight points as necessary to conform to the variable geometry inherent in natural topography. Compensation for this work shall be considered as included in the price paid for the various contract items of work involved, and no additional compensation will be allowed.

B. After the placement of the engineered fills and non-structural fill, the sides and top shall be dressed by final passage of compaction equipment or by dragging to give a smooth surface. The surface area shall be graded to provide surface drainage to flow to desired locations.

2.8 ROADS AND RAMPS

A. Temporary Haul Roads. Temporary haul roads shall be constructed as required to transport materials from borrow source or excavation to Engineered Fill site. Temporary ramps to be constructed for the CONTRACTORS convenience need not comply with these foundation preparation and Engineered Fill construction requirements. Unless otherwise directed by the ENGINEER, temporary ramps shall be removed prior to completion of the work.

2.9 GRADE TOLERANCES

A. Engineered Fill:

1. General. Engineered Fills shall be constructed to the net grade and cross section shown on the Drawings.
2. Grade Tolerances. At all points a tolerance of 0.5 foot above, and 0.25 foot below the prescribed grade will be permitted in the final dressing, provided that any excess material is so distributed that the crown of the Engineered Fill drains in the desired direction and that there are no abrupt humps or depressions in surfaces. However, this tolerance may be modified at locations where, in the opinion of the ENGINEER, such modifications will not impair the design or appearance of the project.

2.10 SLIDES

A. In the event of the sliding of any part of the Engineered Fill during its construction, or during the one year period after acceptance, the CONTRACTOR shall, upon written order of the ENGINEER, cut out and remove the slide and then rebuild that portion of the Engineered Fill.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Stripping: Stripping will not be separately measured for payment.

B. Excavation

1. Unclassified Excavation: Unclassified Excavation will be measured by the cubic yard of excavation, based on the Dimensions shown on the Drawings. Where the dimensions of any portion of the work area are revised by the ENGINEER, or a portion of the work is eliminated, the charge will be measured by the cubic yard based on surveyed sections before and after the excavation.
2. Other Miscellaneous Excavation: All other excavations will not be measured separately for payment. This includes all excavations exceeding the limits shown on the drawings excerpt where approved by the ENGINEER. It also includes any clearing, stripping and grading of access roads, and clearing of temporary and permanent stockpile areas.

C. Engineered Fill

1. Engineered Fill will be measured by the cubic yard of Engineered Fill, based on the dimensions and quantities shown on the Drawings. Where the dimensions of any portion of the work are revised by the ENGINEER, or a portion of the work is eliminated, the change will be measured by the cubic yard based on surveyed sections before and after fill placement.

D. Non-structural fill

1. Non-structural fill will be measured by the cubic yard based on the difference between the quantities of unclassified excavation (per Section 312316: Stripping and Excavation) and Engineered Fill.

3.2 PAYMENT

A. Stripping.

1. No separate payment will be made for stripping. All costs in connection with this work will be considered incidental to the contract price per cubic yard for Excavation

B. Excavation

1. Unclassified Excavation, measured as specified above, will be paid for a the contract unit price per cubic yard, which will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to complete Unclassified Excavation as specified. This includes:
   a) Excavation
   b) Separation and transport of all excavated materials
   c) Temporary stock pile of material to be reused as engineered fill
   d) Disposal of surplus and deterious soils as compacted non-structural fill

C. Engineered fill

1. Engineered Fill will be paid for at the contract unit price per cubic yard, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to construct compacted Engineered Fills as specified, including hauling of excavated materials from the source, keyway, and required bench drains.
   a) No payment will be made for the Engineered Fill foundation preparation, shrinkage of

material or materials placed above the net grades and slopes as allowance for shrinkage.

D. Non-Structural Fill

1. No separate payment will be made for placement of compacted non-Structural Fill. All costs in connection with the placement and compaction of non-structural fill will be included in the cost of excavation, including hauling of excavated materials from the source, keyways, and required bench drains.

E. Other

1. No separate payment will be made for other miscellaneous grading incidental to the work. All costs in connection with this work will be considered incidental to the cost of construction of the associated improvement.
2. No separate payment will be made under this section for the for the removal, transport and onsite disposal of logs, stumps and crib logs.

F. Payment will be made under:

Pay Item	Pay Unit
Excavation	CY
Engineered Fill	CY

END OF SECTION

SECTION 312319
DEWATERING

SECTION 312319
DEWATERING

1 GENERAL

1.1 DESCRIPTION

A. Furnish all labor, materials, equipment, and incidentals necessary to design, construct, operate, maintain, and remove all cofferdams, flumes shoring, diversions, filtration systems and/or other measures, including pumping, to dewater the construction site and to divert streamflow and other surface waters through or around the project area 24 hours a day during the entire field construction period, as shown on the Drawings, as specified, or as directed by the ENGINEER.

B. Dewatering details on the Drawings (if provided) are schematic. The design and implementation of the Dewatering Plan is solely the responsibility of the Contractor. Contractor shall make their own independent evaluation of water sources (surface and groundwater) in preparing their Dewatering Plan.

C. Dewatering shall comply with all project permit conditions, applicable laws and local ordinances.

1.2 RELATED SECTIONS

015713.01	Fiber Roll
354237	Rock Slope Protection
015713	Temporary Erosion Control and BMP's

1.3 REFERENCE STANDARDS – NOT USED

1.4 SUBMITTALS

A. The Contractor shall submit the following for review and approval of the ENGINEER:

1. A Dewatering Plan listing materials, method of work, equipment to be used, methods for disposal of pumped water, provisions to prevent scour and erosion, and the proposed schedule shall be submitted to the ENGINEER. Approval of the ENGINEER shall be required before the Contractor proceeds with water control measures.
2. Product data for:
   a) Pumps
   b) Silt control filter fabric
   c) Washed rock
   d) Impervious liners
   e) Cofferdam material
   f) Other materials used in dewatering

1.5 MATERIALS – NOT USED

1.6 QUALITY ASSURANCE

A. Comply with all applicable permits and regulations.

B. Comply with scheduling requirements set forth in the project Storm Water Pollution Prevention Plan
C. Comply with approved Hazardous Materials Control and Spill Prevention Plan, in accordance with Section 015000 Mobilization: Hazardous Material and Spill Prevention Plan.
D. Notify ENGINEER 48 hours in advance of installation of temporary cofferdam(s) or diversion.
E. Notify ENGINEER 48 hours in advance of removal of temporary cofferdam(s) or diversion.

1.7 MATERIALS

A. General. The Contractor shall be responsible for sizing and design of temporary cofferdams, well points, pumps, drains, pipes and other diversion and dewatering facilities. Comply with Drawings and regulatory requirements.
B. Imported Rock. Use only clean washed rock. Other materials, if used, shall be removed from site when dewatering work is complete.
C. Dewatering Facilities. Provide and operate dewatering facilities of suitable size and capacity.
D. The use of equipment shall be consistent with the manufacturer's recommendations. Comply with Sections 015713.01: Fiber Roll and 015713.02: Silt Fence.

2 EXECUTION

2.1 GENERAL

A. Contractor is solely responsible for the design, construction, and maintenance and monitoring of the diversion and dewatering facilities. Comply with the Drawings, Specifications, and applicable permit conditions.

2.2 SEDIMENT CONTROL

A. General. Comply with Section 401 Water Quality Certification and/or approved SWPPP in accordance with Section 015723, SWPPP Implementation.
B. Materials. Earthen materials shall not be used within the flowing channel, with the exception of clean, washed rock. Earthen materials may be used to construct the cofferdam.
C. Cofferdam Construction. During construction of the cofferdam, install silt barrier(s) along the water side of the installation, as necessary to minimize mobilization and entrainment of disturbed soils within the active flowing channel, to a level in accordance with the permit conditions.
D. Discharge of diverted flow. Unless otherwise specified, a diversion must discharge into the same natural drainage way in which its headworks are located. Where feasible, discharge to existing pools or onto bedrock or otherwise erosion resistant surfaces. Construct energy dissipators at diversion outlets, where necessary to prevent scour at point of discharge.
E. Discharge of Seepage/Groundwater. Discharge water from the dewatered construction site either by gravity or pumping in a manner to prevent excessive turbidity from entering the receiving waters and to prevent scour and erosion outside of the construction site. Pumped water should be pre-filtered with sand/gravel pack around sumps for subsurface flows and a silt fence or hay bales around pumps for surface flow.
F. Discharge pumped water into adjacent gravel bars, isolated local depressions, or temporary

sediment basins, as shown on the Storm Water Pollution Prevention Plan. Where discharging water into the river will create excessive turbidity, route water through a sediment interceptor or other facilities to remove sediment from water.

G. Isolation of Construction Area. Place silt fences, hay bale barriers, or cofferdams between construction area and flowing river channel, at all locations, in accordance with the approved Storm Water Pollution Prevention Plan.

2.3 HAZARDOUS MATERIAL CONTROL

A. General. Comply with the approved Hazardous Materials Control and Spill Prevention Plan (HMC&SPP) in accordance with Construction Facilities and Temporary Controls, Section 01500.

B. Equipment and Lubricants. Steam-clean all equipment prior to its use. Inspect all equipment for cleanliness and fluid leaks prior to use and monitor during its use. Maintain equipment as required. Equipment refueling shall only take place in a designated, contained area.

C. Isolation of Construction Area. Prior to performing work within flowing water, outside of cofferdams, install oil containment booms downstream of the work area. Maintain booms until completion of the work within the channel is complete.

D. Spills. Maintain a supply of oil spill booms, sorbent pads, and other supplies to contain and clean spills. Comply with approved HMC&SPP should spills occur.

2.4 COFFERDAMS

A. General. The Contractor is solely responsible for the design, construction, maintenance, and monitoring of cofferdams, dikes and other isolation facilities.

B. Configuration. Cofferdam alignments, as shown on the Drawings, reflect the maximum allowable encroachment into the channel. Construct cofferdam alignments as shown or the Drawings, unless otherwise approved by ENGINEER. Provide cofferdams high enough to account for water surface fluctuations.

C. Secondary Dikes/Seepage Control. Secondary dikes within the isolated construction area can be used to control seepage and groundwater around excavations, provided all dike materials are removed from the exposed channel upon completion, prior to re-watering the work area.

2.5 FLOW BYPASS

A. Capacity. Bypass water around construction site using a cofferdam and bypass pipe as shown on the Drawings or equivalent facility, as approved by the ENGINEER. The bypass system shall be capable of passing the flows present at the time construction begins, with a minimum of 12 inches of freeboard (measured vertically from water surface to lowest point on dam). Flow may be pumped or gravity fed around the work area. If gravity fed, the bypass pipes shall have a minimum diameter of 8 inches to minimize the likelihood of clogging by debris. Stream flow may be p[umped around the work area during construction and gravity feed through the work area in a solid pipe during periods of non-work.

B. Pumping Facilities. All pump intakes shall have one or more 0.25 inch mesh screen filters to prevent the entrainment of fish and other aquatic animals, in accordance with project permit conditions. Pumps and discharge piping shall be suitable for the type of service

provided and shall be a sufficient size and capacity to satisfactorily dewater work areas. Engines shall be muffled to avoid excess noise and pump intakes shall be fitted with screens as required. Contractor shall have an extra (backup) pump during dewatering.

C. Storm Events. During the designated period for instream work, the Contractor shall be solely responsible for the integrity of the dewatering system. If rain is predicted, the Contractor shall perform flood fighting activities as directed by the ENGINEER and regulatory agencies.

D. The diversion system may require adjustment to accommodate the sequence of work. No additional compensation shall be provided for any adjustments, revisions, or reinstallations of diversion elements.

E. The diversion shall result in conditions that allow the required compaction to be achieved and shall prevent sediment-laden water that exceeds the effluent discharge limits from entering the drainage ways.

F. Unless otherwise specified, a diversion must discharge into the same natural drainage way in which its headworks are located.

2.6 DEWATERING

A. General. Remove water from construction area using pumping, well points, drains, or other approved methods. Construction water shall be segregated from seepage water and routed through sediment interceptors or other facilities to remove contaminants and sediment. Excavated slopes in the saturated soils may need to be retained, tied back, or otherwise stabilized.

B. Well/Sump Points. Well/Sump points shall be designed to preclude the loss of fine soil by sand/gravel packing or other suitable means.

C. Pumping Facilities. All pump intakes shall have one or more 0.25 inch mesh screen filters to prevent the entrainment of aquatic animals, in accordance with project permit conditions. Pumps and discharge piping shall be suitable for the type of service provided and shall be a sufficient size and capacity to satisfactorily dewater work areas. Engines shall be muffled to avoid excess noise and pump intakes shall be fitted with screens as required. Contractor shall have an extra (backup) pump during dewatering.

D. Power Supply. Consider the availability and reliability of power sources for dewatering operation in dewatering system design and make provisions for temporary or backup power supply as deemed necessary. Where the primary diversion is operated by pumping, provide a backup system with automatic controls capable of starting the backup upon failure of the primary system.

E. Groundwater. Dewatering shall maintain water surfaces below the base of temporary excavations or trenches, to allow for visual inspection of the work, if requested by the ENGINEER. Lower groundwater tables within excavations for structures to a minimum of two (2) feet below foundations or as otherwise required to establish a firm, stable foundation. Control groundwater within excavation until completion of backfill operations.

2.7 WATER LEVELS DURING THE CONSTRUCTION PERIOD

A. The Contractor shall be responsible for making an independent evaluation of site conditions. The Contractor's dewatering plan shall address all potential sources of surface and groundwater, including but not limited to streamflow (natural or managed), backwatering of

the channel from downstream blockages, domestic water lines, storm drain outfalls, irrigation tailwater, industrial discharges, seepage, and direct rainfall.

2.8 CLEANUP

A. Thoroughly clean up area to remove debris and contaminated materials. Remove fine sediments and restore disturbed area prior to removal of the dewatering facilities. Clean and round river run gravels or cobbles, if used in cofferdam construction, may be spread in the creek channel in lieu of removal, provided grading will not interfere with facility operation.

2.9 REMOVAL OF DEWATERING FACILITIES

A. Prior to removal of the dewatering facilities, complete the following activities:
   1. Complete required tests and inspections.
   2. Thoroughly cleanup work site.
   3. Perform final walkthrough with ENGINEER.

B. Prior to removal of cofferdams and diversion, equalize the water surface levels on both sides of the dams.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Work under this section will be measured for payment on a lump sum basis.

3.2 PAYMENT

A. The lump sum contract price for Dewatering will include full compensation for the furnishing of all labor, materials, tools, equipment, administrative costs, and incidentals necessary to complete the dewatering operations, as specified, including temporary cofferdams, pumping, silt control, filter fabric, sediment control, erosion control, removal of muck, disposal of materials, and removal of dewatering facilities.

Pay Item	Pay Unit
Dewatering	Lump Sum

END OF SECTION

SECTION 321540
AGGREGATE BASE

SECTION 321540
AGGREGATE BASE

1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of furnishing all plant, labor, and material and performing all operations necessary for placing aggregate base as specified, as shown on the Drawings, or as otherwise directed by the Engineer. The work includes all necessary stripping, clearing and grubbing, shaping and compacting of roadbed and finished rock surface, watering, or other incidentals required to complete the work.

1.2 RELATED SECTIONS

311100 CLEARING AND GRUBBING
312300 EXCAVATION AND FILL

1.3 REFERENCE STANDARDS

A. State of California, Department of Transportation (CALTRANS) State Standard Specifications, current edition

California Test	Method of Test for:
202	Sieve Analysis of Fine and Coarse Aggregates
214	Soundness of Aggregates by Use of Sodium Sulfate
216	Relative Compaction of Untreated and Treated Soils and Aggregates
231	Relative Compaction of Untreated and Treated Soils and Aggregates by the Area Concept Utilizing Nuclear Gages

1.4 SUBMITTALS

A. Submit to the Engineer, for review, the following:
   1. Source of aggregates.
   2. Test results, performed within the last six (6) months, showing that the aggregates conform to all the material requirements specified herein.
   3. Certified weights of aggregate base rock delivered to the site.
   4. Manufacturer's data sheet for Geosynthetic Fabric.

1.5 PRODUCTS

A. Aggregate Base Course shall be Class 2 Aggregate Base, 1-1/2 inch maximum, conforming to Caltrans Standard Specifications.

B. Stabilization Fabric. Stabilization Fabric, where specified, shall be as shown on the Drawings.

2 EXECUTION

2.1 PLACING, COMPACTING, AND FINISHING

A. Preparation of Subgrade. Prior to constructing the aggregate base course, the sub-grade shall be cleaned of all foreign substances. The sub-grade then shall be shaped as indicated on the Drawings, as specified, or as directed by the Engineer. Preparation of road subgrade includes clearing all loose material accumulated at the toe of cut slopes and extending outboard to the break point at the road shoulder, as necessary to ensure proper drainage is achieved and maintained. After rough shaping, the subgrade shall be scarified to a minimum depth of 6 inches, moisture conditioned, and compacted to a minimum of ninety-five percent (90%) relative compaction, based upon California Test Methods 216 or 231. Subgrade preparation and compaction shall extend a minimum of 12" beyond the proposed limits of the aggregate base. Ruts or soft, yielding spots shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting.

B. Grade Control. During construction, the lines and grades including crown and cross slope indicated for the aggregate base course shall be maintained by means of line and grade stakes placed by the Contractor.

C. Geosynthetic "Stabilzation Fabric". Where geosynthetic stabilization fabric is specified to be placed below the aggregate base, comply with Section 26-1.03C, "Placing Geosynthetic Materials", of the Standard Specifications. If geosynthetic fabric is shown, compact AB with either (1) a smooth-wheeled roller or (2) a rubber-tired roller. Do not use vibratory devices during compaction.

D. Placing. The mixed material shall be placed on the prepared subgrade in layers of uniform thickness with a suitable spreader. No layer shall exceed 6 inches or be less than 3 inches when compacted, unless otherwise specified on Drawings or directed by the ENGINEER. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

E. Compaction. The layer of aggregate base course, including shoulders, shall be compacted to a minimum of ninety percent (90%) relative compaction, based upon California Test Methods 216 or 231. Water content shall be maintained during the compaction procedure such that the water content is within plus or minus two percent (2%) of optimum water content. In all places not accessible to the rollers, the aggregate base course material shall be compacted with mechanical tampers.

F. Finishing. The surface of aggregate base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. In no case shall thin layers of material be added to the top layer of base course to meet grade. If the elevation of top layer of base course is one inch or more below the grade, the top layer of base shall be scarified to a depth of at least three inches, new material shall be added, and the layer shall be blended and recompacted to bring to grade. Adjustments in rolling and finishing procedures shall be made as may be directed to obtain grades, to minimize segregation and degradation of aggregate base coarse material, to adjust the

water content, and to insure an acceptable aggregate base course. Material found unacceptable shall be removed and replaced, with acceptable material.

2.2 FIELD QUALITY CONTROL

A. Smoothness. The surface of the aggregate base course shall not deviate more than one inch when tested with a ten-foot straightedge applied parallel with and at right angles to the centerline of the area covered. Deviations exceeding 1 inch shall be corrected as directed.

B. Thickness. The completed thickness of the aggregate base course shall be within one half inch of the thickness indicated on the Drawings. The thickness of the aggregate base course will be measured at intervals providing at least one measurement for at least each 150 linear feet of aggregate base course. The depth measurement will be made by test holes at least three inches in diameter. Where the measured thickness of the aggregate base course is more than one half inch deficient, such areas shall be corrected by excavating and placing with additional material

C. Compaction. All compaction testing will be performed by the District. Where tests indicate the base course does not meet specified relative compaction, the material represented by the test shall be reworked and recompacted to the specified relative compaction. Reworked areas will be retested until they meet the specified relative compaction. The costs of all retests will be deducted from monies due or to become due the Contractor.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Aggregate Base will be measured for payment by ton, to the nearest ton. Quantities of aggregate base to be paid for by the ton will be calculated on the basis of delivered rock.

3.2 PAYMENT

A. Aggregate Base will be paid for at the contract price per ton, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in constructing aggregate base, including subgrade preparation and subgrade compaction, as shown on the Drawings, and as specified, and as directed by the Engineer.

B. Payment will be made under:

Pay Item	Pay Unit
Aggregate Base	Ton
SF Subgrade Stabilization	LF

END OF SECTION

SECTION 334100:
STORM DRAINAGE SYSTEMS - CULVERTS

SECTION 334100:
STORM DRAINAGE SYSTEMS - CULVERTS

1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section consists of furnishing and installing the culverts as shown on the Drawings, as specified herein, or as otherwise directed by the Engineer. Work includes, but is not limited to the following:
   1. Stream Culverts
   2. Ditch Relief Culverts
   3. Rock Energy Dissipators
   4. Headwalls
   5. Trenching and backfill for culverts

B. Furnish and install all storm drain pipes, headwalls, inlets, grates, cleanout boxes, inlet protection and outlet energy dissipaters, and perform associated structural excavation, backfill, and compaction.

1.2 RELATED SECTIONS

311100 CLEARING AND GRUBBING
312319 DEWATERING
312300 EXCAVATION AND FILL
354237 ROCK SLOPE PROTECTION

1.3 REFERENCE STANDARDS

A. State of California Department of Transportation (CALTRANS) Standard Specifications
B. ASTM A742
C. ASTM A762
D. ASTM D2321

1.4 SUBMITTALS

A. Submit to the Engineer, for review, the following:
   1. Polymer Coated Steel Pipe (CSP)
      a) Manufacturer's catalog data and installation instructions for pipe materials, including angles, fittings, and anchorage assemblies. A Certificate of Compliance(s) for each type of pipe furnished and proposed for installation. The certificate shall also certify that the pipe and joints comply with the requirements of the specifications Submit the manufacturer's certification or copy of plant audits and test results from the testing for each pipe diameter furnished and its conformance with AASHTO minimum requirements.

1.5 PRODUCTS

A. POLYMER COATED STEEL PIPE (CSP)
   1. Polymer Coated Steel Pipe (CSP) shall conform to applicable requirements of AASHTO M245 or ASTM A762.
   2. Material: The polymer coated steel coils shall conform to the applicable requirements of AASHTO M246 or ASTM A742. The polymeric sheet coating must be applied to both sides of the galvanized sheet before corrugating. The thickness of the coating must be at least 0.010 inch. Pinholes, blisters, cracks, or lack of bond are cause for rejection.
   3. Coupling bands: Coupling bands and connecting hardware for coated pipes must have a protective coating. Water tight gaskets are to be provided for each coupling band. The fabrication of coupling bands and fastening hardware shall be sufficient to provide the required gasket seating without warping, twisting, or bending.
   4. The pipe size, gauge and corrugations are shown on the Drawings.
   5. Contech Polymer Coated HEL-COR CMP Pipe conforms to these recommendations.

B. HDPE pipe
   1. Dual-walled high-density polyethylene (HDPE) pipe with a smooth (non-corrugated) interior surface, and shall have a Manning's roughness coefficient of 0.012, conforming to the notes and details on the Drawings.
   2. ADS N12 ST IB pipe conforms to this specification.

C. Rock Energy Dissipater and Headwalls
   1. Comply with Section 354237 Rock Slope Protection and details on the Drawings.
   2. Rock sizes are shown on the Drawings.

1.6 QUALITY ASSURANCE

A. The contractor shall comply with inspection schedule on Drawings.

B. Foundation soil shall be examined by the Engineer to ensure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with acceptable material at the discretion of the Engineer.

C. All grading activities shall comply with the requirements of the Geotechnical Engineering Report prepared by Haro, Kasunich and Associates, dated July 2017. The Geotechnical Engineering Report shall govern all grading activities.

2 EXECUTION

2.1 GENERAL

A. Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Polymer Coated Steel Pipe (CSP)
   1. Installation shall be in accordance with AASHTO Standard Specifications for Highway Bridges, Section 26, Division II or ASTM A798 and in conformance with the project Drawings and specifications. If there are any inconsistencies or conflicts, the contractor must bring them to the attention of the ENGINEER

C. HDPE pipe

1. Installation shall be in accordance with ASTM D2321 and manufactures recommended installation guidelines.

2.2 TRENCHING

A. Conform to Technical Specification 312000 Excavation and Fill unless otherwise directed by the ENGINEER

B. Culvert trenches must be properly shored and braced during construction or laid back at an appropriate angle to prevent sloughing and caving at sidewalls. The final project Drawings and Specifications should direct the attention of the contractor to all CAL OSHA and local safety requirements and codes dealing with excavations and trenches.

2.3 CULVERT BED

A. The width of trenches shall permit satisfactory joining and thorough tamping of the backfill material.

B. The culvert bed shall be clean and free of large woody debris and large rocks. Unsuitable material shall be replaced with selected granular drainage material and compacted to obtain uniform bed.

C. Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the culvert grade for a depth of at least 1 foot and a width of at least 2 feet plus the culvert diameter. This material shall be replaced with selected compacted fill.

2.4 LAYING PIPE

A. Exercise care to prevent damage to pipe during handling, transportation and storage.

B. Pipes shall be laid to the lines and grade shown on the Drawings or as approved by the Engineer.

C. Culvert shall be laid in center of trench on uniform grade line. The entire length of pipe shall be in contact with the culvert bedding.

D. Allowable joint deflection or longitudinal bending is dependent on pipe size and/or joint design, and shall not exceed the pipe manufacturer's published limits. No deflection in pipe shall be allowed without prior written acceptance by the Engineer.

E. Culvert shall be joined and anchored per manufacturer's guidelines.

F. CONTRACTOR shall secure culvert to avoid separating or migrating downhill during construction.

2.5 BACKFILL

A. Select mineral soil shall be used for culvert backfill. The backfill shall have no rocks greater than 3 inches in any dimensions placed closer than 1 foot to the culvert.

B. Trenches shall be backfilled with engineered fill and uniformly compacted by mechanical means to not less than 90 percent. The relative compaction will be based on the maximum dry density obtained from a laboratory compaction curve run in accordance with ASTM Test Designation D1557. During placement and compaction of fill, the moisture content of the materials being placed shall be maintained. The bedding material shall be carefully placed and tamped under the haunches of the pipe.

2.6 ROCK ENERGY DISSIPATORS

A. Discharge culverts onto Rock Energy Dissipator per Section 354237 Rock Slope Protection,

as shown on Drawings, and as directed by the Engineer. Dimension of rock shown on Drawings and/or in Specifications.

2.7 ROCK HEADWALL

A. Construct rock headwall at culvert inlet per Section 354237 Rock Slope Protection, as shown on Drawings, and as directed by the Engineer. Dimension of rock shown on Drawings.

2.8 CULVERT INLET

A. Miter culvert inlet if specified on Drawings.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. Dark Gulch Culvert
   1. Work under this section will be measured for payment on a lump sum basis.

B. Ditch Relief Culverts
   1. Work under this section will be measured for payment per unit Length.

3.2 PAYMENT

A. Dark Gulch Culvert
   1. The lump sum contract price for DARK GULCH: Storm Drainage Systems - Culverts**,** will include full compensation for the furnishing of all labor, materials, tools, equipment, administrative costs, and incidentals for Storm Drainage Systems – Culverts.
   2. Payment does not include work associated with placement of Rock Slope Protection, Rock Energy Dissipators, or Rock Headwalls at Dark Gulch. Rock Slope Protection, Rock Energy Dissipators, or Rock Headwalls will be payed per Section 354237 ROCK SLOPE PROTECTION

B. Ditch Relief Culverts
   1. The contract price for DITCH RELIEF CULVERTS: Storm Drainage Systems - Culverts**,** will include full compensation for the furnishing of all labor, materials, tools, equipment, administrative costs, and incidentals for Storm Drainage Systems – Culverts.
   2. Payment will also include all work associated with placement of Rock Energy Dissipators and Rock Headwalls at ditch relief culverts as specified in the Drawings

C. Payment will be made under:

Pay Item	**Pay Unit**
Dark Gulch Culvert	Lump Sum
Ditch Relief Culverts	LF

END OF SECTION

SECTION 354237
ROCK SLOPE PROTECTION

SECTION 354237
ROCK SLOPE PROTECTION

1 GENERAL

1.1 DESCRIPTION

A. Work within this section shall include furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing, Rock Slope Protection (RSP), Rock Slope Buttresses, Rock Energy Dissipaters, Rock Inlet Protection, backing layers, backfill and geotextile fabric where shown on the Drawings, specified herein, or as otherwise directed by the ENGINEER. Stone protection, rock slope protection, and riprap are interchangeable in these Specifications and Drawings.

B. All loading, transport, temporary stockpiling, processing and mixing of stone materials to achieve designated gradations, washing, on-site hauling, excavation, preparation of sub-grade, placement, embedment, backfill, grading, compaction, finish grading, clean- up, and off-haul and disposal of excess materials needed to install all Rock Slope Protection work, where incorporated in the work, shall be considered as included in the applicable bid item unit price, and no additional compensation will be allowed.

C. The location, alignment, angles, elevations, grades, slopes, dimensions, etc. of the proposed treatments, and structures as described in this section are shown on the Project Plans to provide a basis for construction and bidding purposes. The ENGINEER is expected to make minor revisions and provide direction in the field to fit any varying field conditions. The CONTRACTOR shall include all costs for working under the direction of the ENGINEER in his/her bid for this work, as no additional compensation will be allow therefore.

D. The CONTRACTOR is hereby notified that the ENGINEER may direct the CONTRACTOR to place additional stone materials (not shown on the Plans) at select locations within the project work treatment areas to fit existing conditions at the time of construction. Any such additional stone materials and placement shall be considered as included in the unit prices paid for the designated stone materials as described elsewhere in these Technical Specifications and no additional compensation shall be allowed for.

1.2 RELATED SECTIONS:

334000 Storm Drainage Facilities
312319 Dewatering
312316 Stripping and Excavation

1.3 SUBMITTALS

A. Submit to the ENGINEER, for review, the following:

1. Manufacturer's product data and installation instructions for specified geotextile fabrics.
2. Certified weights of the rock delivered to the site.
3. Certificate(s) and other material testing data as necessary to validate the source of the Rock Materials and their conformance with the Standard Specifications and these Technical Specifications. Include all applicable test results for grading, specific gravity,

resistance to degradation, absorption, durability index, and soundness (as described elsewhere in these Technical Specifications).

4. A representative 5 cubic yard sample of each of the proposed Rock Materials specified herein shall be delivered to the site for inspection and approval of the ENGINEER, ten days prior to delivery of the remainder of material to the project site. The ENGINEER reserves to the right to reject said materials.
5. Sampling and Testing Assistance. Any difference of opinion between the ENGINEER and the CONTRACTOR shall be resolved by dumping and checking the gradation of the two random truck loads of rock. Mechanical equipment, a sorting site and labor needed to assist in checking gradation shall be provided by the CONTRACTOR at no additional cost to the Client.

1.4 QUALITY ASSURANCE

A. Tolerances. Place rock to a vertical tolerance of plus or minus 4 inches.

B. Subgrade Preparation. Prior to placement of rock, ENGINEER shall verify subgrade preparation, and placement of fabric for rock. Where backing is shown on the Drawings, ENGINEER shall verify subgrade preparation and backing placement prior to placement of outer rock course.

1.5 MATERIALS

A. Salvaged Rock Material. Native rock found on site may be salvaged for reuse, subject to compliance with the material requirements for the intended use, and subject to the approval by the ENGINEER. The ENGINEER may require the CONTRACTOR to provide testing (e.g. gradation curve, hardness, etc.) to ensure that materials are suitable for reuse. Salvaged creek bed material shall be placed on a hardened surface or other suitable material (i.e. steel plate, pavement, filter fabric) in order to protect the said material from contamination or mixing with other soils, earthen material and debris. The ENGINEER may, at his sole discretion, waive certain testing requirements to facilitate the CONTRACTOR'S use of locally salvaged materials.

B. Rock materials and gradation shall conform to Section 72-2.02 Materials of the State Standard Specifications. Stones shall be sound, durable, hard, resistant to abrasion and free from laminations, weak cleavage planes, and the undesirable effects of weathering. It shall be of such character that it will not readily disintegrate from the action of air, water, or the typical conditions experienced during handling and placing. All aggregate material shall be clean and free from deleterious impurities, including alkali, earth, clay, refuse, and adherent coatings.

C. Rock size classes not designated below shall be as shown on the Drawings, or as directed by the ENGINEER. All stone, rock, aggregate materials, and soils imported to the site shall be from a certified "Weed Free" source approved by the District.

D. RSP. Comply with Section 72 of the State Standard Specifications for the rock classes indicated on the Drawings. RSP shall be sub-rounded to angular.

E. Rock Slope Protection Fabric. Rock slope protection fabric shall conform to the notes on the Drawings.

2 EXECUTION

2.1 GENERAL

A. All rock materials shall be placed in such a manner as to smoothly conform to adjacent graded areas. Smaller rock shall be chinked into the margins of larger rock placements, as necessary to conform to earthwork and prevent migration of fines from adjacent graded areas into the rock matrix.

2.2 ROCK SLOPE PROTECTION FABRIC

A. Place a layer of geotextile fabric below the first rock layer, where shown on the Drawings. At the time of installation, the geotextile shall be rejected if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, or storage. Prepare surface to receive the geotextile to a relatively smooth condition, free of obstructions, depressions, debris, and soft or low density pockets of material. Place geotextile with the long dimension parallel to flow and laid smooth and free of tension, stress, folds, wrinkles, or creases. Place the strips to provide a minimum width of 18 inches of overlap for each joint. Remove the temporary pins as rock is placed to relieve tensile stress. Any geotextile fabric that is damaged during its installation shall be replaced by the CONTRACTOR at no cost to OWNER.

2.3 ROCK SLOPE PROTECTION GRAVEL FILTER

A. Place a gravel filter layer below first rock layer, where shown and specified on the drawings.

2.4 ROCK SLOPE PROTECTION

A. Install Rock Slope Protection in accordance with Section 72 of the State Standard Specifications Method A, as modified below, and to the lines and the minimum dimensions shown on the Drawings. Where specified, place Backing per Method B and spread so as not to damage the bottom layer of the geotextile fabric. Place rock so as to minimize the number of voids. Rock shall be placed in lifts with a thickness not exceeding the D_{100} of the specified stone. Each lift shall be backfilled to half its depth with native granular soils, prior to placement of the subsequent lift. Backfill shall be placed in a manner that does not interfere with direct rock to rock contact of successive lifts. Backfill shall be placed to match the finished surface of the RSP and water-jetted to fill all voids, as directed by the ENGINEER.

2.5 ROCK ENERGY DISSIPATORS

A. The specified geometry and volume of rock shown on the Drawings at Rock Energy Dissipators is approximate. Final dimensions and rock volume may be adjusted in the field, at the direction of the ENGINEER, to suit field conditions.

B. Rock will not be allowed to be “dumped”. Following ENGINEER’S approval of fabric underlayment (if shown on the Drawings), the rock shall be placed as directed by the ENGINEER for a natural appearance, which may require hand placement of rock. The CONTRACTOR shall take all necessary measures to protect fabric, or blanket from damage (if such material is damaged the product shall be repaired per the manufacturer’s recommendations, and as directed by the ENGINEER). All rock is to be placed to minimize the potential for movement when flow is induced into the channel and this will be accomplished by interlocking the angular nature of the rock with itself, and by placing larger stones first, with direct stone to stone contact, and then chinking the voids with the smaller materials.

C. The energy dissipator geometry shall conform to the finished grades of the slopes on all sides. Local surface irregularities of the rock rip-rap shall not vary from the planned slopes by more than four inches (6-in) measured at right angles to the slope.

3 MEASUREMENT AND PAYMENT

3.1 MEASUREMENT

A. DARK GULCH

1. Rock Slope protection (RSP), Rock Energy Dissipators (RED's), and Rock Inlet Protection at Dark Gulch will be measured by the cubic yard determined from the dimensions as shown on the Drawings or the dimensions constructed as directed by the ENGINEER. Materials placed in excess of these dimensions will not be included the measurement for payment. Surface areas will be measured to the horizontal limits parallel to the ground surface.
2. Excavation and backfill for rock slope protection will not be separately measured for payment.

B. DITCH RELIEF CULVERTS

1. Rock Slope protection (RSP), Rock Energy Dissipators (RED's), and Rock Inlet Protection at ditch relief culverts shall not be independently measured for payment. The cost of this work shall be included in the lump sum price for the related work.

C. Where additional rock slope protection (not shown on the Drawings) is placed at the request of the ENGINEER to form slope protection, energy dissipators, or inlet protection, this Rock Slope Protection will be measured by the cubic yard, independent of Class of rock, calculated to the nearest cubic yard.

3.2 PAYMENT

A. Rock Slope protection (RSP), Rock Energy Dissipators (RED's), and Rock Inlet Protection at Dark Gulch will be made under:

Pay Item	Pay Unit
Outer gravel filter (1.5 to 3 inch drain rock)	CY
RSP II – V (9 inch): Backing	CY
RSP V – VII (1/4 TO 1/2 ton): Upstream headwall	CY
RSP VII – VIII (1/2 to 1 ton): Rock energy dissipator	CY
RSP IX (2 Ton): Rock energy dissipator	CY

B. No separate payment will be made for Rock Slope protection (RSP), Rock Energy Dissipators (RED's), and Rock Inlet Protection at ditch relief culverts shall not be independently measured for payment. The cost of this work shall be included in the lump sum price for the related work.

C. Additional Rock Slope Protection, rock energy dissipators, or rocked inlet protection, measured as specified above, will be paid for at the contract price per cubic yard, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the riprap placement, including subgrade preparation, geotextile fabric, processing work, backfill of voids, excavation and fill.

END OF SECTION