

Kiewit Infrastructure West Co.
Klamath River Renewal Project
Technical Specifications

31 25 00 EROSION AND SEDIMENTATION CONTROLS

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REVISION INDEX

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SECTION 31 25 00 EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes temporary and permanent erosion and sediment controls including but not limited to the following:
 - 1. Permanent erosion and sedimentation controls installed by the Contractor as specified in this Specification and as set out in the Drawings.
 - 2. Temporary erosion and sediment controls installed by the Contractor where required.
 - 3. The conversion of temporary measures to permanent measures.

1.2 RELATED SECTIONS

- A. Section 02 41 00 – Demolition and Facility Removal.
- B. Section 31 05 00 – Materials for Earthwork.
- C. Section 31 10 00 – Clearing, Grubbing and Stripping.
- D. Section 31 23 00 – Excavation and Fill Placement.
- E. Section 31 60 00 – Foundation Preparation.
- F. Section 31 80 00 – Care of Water.

1.3 REFERENCE STANDARDS

- A. AASHTO
 - 1. AASHTO M294: Standard Specification for Corrugated Polyethylene Drainage Pipe 12" - 60" (304.8mm – 1524.0mm).
- B. ASTM or ASTM International (ASTM):
 - 1. ASTM C602 - Standard Specification for Agricultural Liming Materials.
 - 2. ASTM D3350: Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.

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3. ASTM F477: Standard Specification for Elastomeric Seals (Gaskets) for Joint Plastic Pipe.
 4. ASTM F2306: Standard Specification for 12" – 60" (304.8mm – 1524.0mm) Annular Corrugated Profile-Wall Polyethylene Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
- C. State of California Water Resources Control Board:
1. California Stormwater Quality Association BMP Handbook – Construction.
 2. Construction General Permit (CGP).
- D. State of Oregon Department of Environmental Quality:
1. Construction Stormwater Best Management Practices Manual, 1200-C NPDES General Permit.
 2. Section 8. Site Restoration, Erosion and Sediment Control, Clean Water Act Section 401 Certification.
- E. State of California Department of Transportation (Caltrans) Standard Specifications, Section 21 – Erosion Control.
- F. State of Oregon Department of Transportation (ODOT):
1. Oregon Department of Transportation (ODOT): Oregon Standard Specifications for Construction, 2018.
- 1.4 DEFINITIONS
- A. **Permanent Erosion and Sediment Control** – measures required to address long term, post-deconstruction erosion and sedimentation control, that are related to stormwater pollution prevention.
- B. **Temporary Erosion and Sediment Control** – measures installed by the Contractor to control the erosion and stormwater pollution during the mobilization and deconstruction Work.
- C. **BMPs** – Best Management Practices, as specified in the referenced standards of the CASQA and Oregon DEQ. Non-stormwater management, material management including concrete, and dredging BMPs referenced in the standards are excluded from this specification and are addressed in the management plans.
- D. **SWPPP** – Stormwater Pollution Prevention Plan, in California.
- E. **QSP** – Qualified SWPPP Practitioner in California.

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- F. **QSD** –Qualified SWPPP Developer in California.
- G. **CPESC** – Certified Professional in Erosion and Sediment Control in California and Oregon.
- H. **Pre-Drawdown Year** – The calendar year when the Contractor mobilizes for the deconstruction and modifies, adjusts or adapts the existing dams and appurtenant structures to facilitate safe drawdown of the reservoirs, as shown on the Drawings.
- I. **Drawdown Year** – The calendar year, following the pre-drawdown year, when the four reservoirs will be drawdown; the dams and associated facilities will be demolished, deconstructed, buried, and/or removed; and the fish volitional channels will be restored.
- J. **Final Stabilization** – Surface treatment or cover to provide erosion control as a permanent measure. In general terms, the measure may be vegetative or non-vegetative or a combination thereof. The QSP/CPESC will provide for determination of the final stabilization, based on visual inspection.
- K. **Non-vegetative Final Stabilization** – Placement of a final cover material, not suitable for vegetation, at final grade as shown on the Drawings. Fines are soil materials passing a US standard sieve #200 and are limited to 10% of the surface layer, by weight. Per the Drawings and Section 31 05 00 – Materials for Earthwork, acceptable materials are Select Fill (E4) and General Fill (E9b). The QSP/CPESC will provide for determination of the final stabilization, based on visual inspections or other means.
- L. **Vegetative Final Stabilization** – Hydroseeding the final cover material, suitable for vegetation, at final grade as shown on the Drawings. Fines are soil materials passing a US standard sieve #200 and must be greater than 10% of the surface layer, by weight. Per the Drawings and Section 31 05 00 – Materials for Earthwork, acceptable surface materials for hydroseeding would General Fill (E9). The QSP/CPESC will provide for determination of the final stabilization, based on visual inspections or other means.
- M. **Rain Event** – A 50% chance or greater forecasted or actual heavy rain event that occurs during the deconstruction activities and may require mobilization and implementation of additional temporary erosion and control measures.
- N. **Rain Event Action Plan** – Pre-Rain Plan for addressing a rain event with a 50% chance or greater. The requirement for these, if any, will be specified in the CA SWPPPs or OR Erosion and Sediment Control Plan.
- O. **Temporary Construction Roads** – Newly constructed roads used for the duration of construction.
- P. **Rehabilitated Construction Roads** – Currently existing roads that need to be widened to accommodate wider trucks with heavier loads.

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- Q. **Permanent Construction Roads** – Newly constructed roads that will be fit for service by the public by the end of construction.
- R. **Hold Point** – A period within the deconstruction activities where further progress awaits the approval or acceptance of the condition or work by the QSP, CPESC.
- S. **Historic Construction** – Initial construction of the dams and appurtenant works.
- T. **Historic Staging Areas** – Staging areas used in the initial construction. These are generally flat and may have some overgrowth.
- U. **Historic Construction Roads** – Construction roads used in the initial construction. These areas have some overgrowth.

1.5 SUBMITTALS

- A. Items listed in this section are to be submitted to the Engineer for information prior to the start of any Works, unless noted otherwise.
- B. Erosion and Sediment Control Plan (ESCP) for Oregon and Stormwater Pollution Prevention Plan (SWPPP) for California including Best Management Practices (BMPs) indicating the specific erosion and sediment control measures, turbidity and silt control measures, air quality and dust control plans, QSP/CPESC hold points and plans for monitoring.
- C. Seed Product Data: Per Reservoir Area Management Plan.
- D. Pre-deconstruction vegetative condition: to establish a baseline for closure of the construction permits, requiring restoration of 70% of the pre-deconstruction vegetative condition or evaluation and documentation of improved conditions using established analytical methods (e.g. RUSLE).
- E. Rain Event Action Plan: Planning for rain events or justification for its exclusion in the CA SWPPPs or the OR Erosion and Sediment Control Plan.
- F. Manufacturer's information on all fabricated materials to be used for the permanent and temporary erosion and sedimentation controls.

1.6 QUALITY ASSURANCE

- A. Work shall be in conformance with the Drawings, submittals, and other project documents.

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials will include fabricated products and natural materials.
- B. To the extent possible, natural erosion control materials such as gravel and rock will originate from local excavations or onsite borrow areas as described in Section 31 05 00 - Materials for Earthwork.
- C. Select materials, as shown on the Drawings, may also fulfill an erosion and sediment control function. All materials shall be implemented as detailed in the Erosion and Sediment Control Plan for Oregon, SWPPP for California, as shown on the Drawings, and as per manufacturer requirements.
- D. Check dams shall generally be comprised of gravel bags that allow ready conformity to the local site topography. For gravel bags to be used for final stabilization, bag material will be made of a biodegradable material like burlap, or similar.
- E. Pipes, and manholes and headwalls for managing storm water collection and conveyance to the outfalls will comply with the Drawings and manufacturer's instructions.
 - 1. The pipe material is high density polyethylene (HDPE). Selected pipe is the Type S HDPE pipe with corrugated exterior and smooth interior. Joints will be gasketed bell and spigot. Nonrated and non-pressure tested watertight joints are suitable for gravity flow drainage applications. The pipe shall conform to the AASHTO and ASTM standards listed in the Reference Standards.
 - 2. The pipe manufacturer shall provide material technical performance information and detailed instructions for installation. The installation instructions shall include minimum cover requirements corresponding to the expected traffic loadings of the Contractor's earthmoving equipment during the deconstruction period.
- F. Grass Seed, Fertilizer and Mulch for Hydroseeding:
 - 1. All seeding and restoration will be per the Reservoir Area Management Plan.
- G. Fiber Roll or Straw Wattles:
 - 1. Straw wattles or fiber rolls shall consist of rolls or bales of tight fibrous material. The wrapping material shall also be primarily biodegradable.
 - 2. See Table 1 for required fiber roll/straw wattle spacing criteria.

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Table 1 – Fiber Roll/Straw Waddle Spacing Criteria

| State | BMP Name | Slope | Spacing |
|------------|---------------------|-----------------------|------------|
| California | Fiber Roll (SE-5) | < 4H:1V | 20' |
| | | 4H:1V < Slope < 2H:1V | 15' |
| | | Slope > 2H:1V | 10' |
| Oregon | Straw Waddle (2.16) | - | 10' to 25' |

H. Tackifier or Soil Binder:

1. A tackifier or soil binder shall be used in locations where appreciable fines are high (>10%), as judged by the QSP/CPESC based on visual inspection.
2. A tackifier or soil binder shall be selected so as to minimize adverse impacts on native fisheries, if required.

I. Construction Entrances/Exits:

1. Construction entrances may comprise natural or man-made materials or a combination thereof.
2. Natural construction materials would include an aggregate-type material similar to E4 or E9b material described in Section 31 05 00 - Materials for Earthworks.
3. Fabricated material would include the many commercially available entrance/exit pads. Such pads are durable, U/V stable, and easily transferred to/from work fronts. Refer to FODS® LLC trackout control system, or similar.

PART 3 - EXECUTION

3.1 GENERAL

- A. Historic staging areas and historic construction roads will be utilized to the extent practical.
- B. Existing vegetation will be preserved to the extent practical.
- C. For the staging areas, an initial setting out of the area will be undertaken prior to full mobilization of equipment, office trailers, and construction plant and services. The setting out will include site planning, establishment of limits, and staking the area. Drainage paths will be confirmed, stormwater diversion berms shall be constructed, and gravel bag check dams shall be established, as shown on the Drawings. The gravel bag check dams are intended to retain sediment upstream from the check dam. Prior to full mobilization, these perimeter BMPs shall be in place.

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- D. During deconstruction works, certain areas, such as powerhouse tailraces, will require dewatering by pumping. In accordance with the CA SWPPP and the OR Erosion and Sediment Control Plan, sediment controls will be used to extract excessive sediment from the pumping discharges.
 - E. Many project areas comprise steep, rocky terrain. Existing and cut stable rock slopes may not require any additional erosion and sediment control measures, as rock is an acceptable erosion and sediment control BMP.
 - F. After safe construction access is established to the disposal areas, the following BMPs will be established:
 - 1. For disposal areas that border along the river valley wall, a buttress toe will be established at the base of the disposal area, above the 100-year flood level, as shown on the Drawings. The toe will be established with E4 or E9b material, which is available from: (a) a local quarry or (b) required excavation from deconstruction of the dams or road improvements.
 - 2. Graded drainage paths along with gravel bag check dams, as shown on the Drawings.
 - G. Within the accelerated deconstruction period, the Contractor shall maintain placement of disposal material within the disposal site boundaries in order to maintain an active work site. Accelerated placement of disposal material will ultimately lead to faster final stabilization, subject to the review of a QSP/CPESC.
 - H. When any disposal area, or portion thereof, is deemed ready for final stabilization by the Contractor, a hold period will be scheduled to facilitate QSP/CPESC review and approval.
 - I. The Contractor shall verify that finished grades of each disposal site are in accordance with the Drawings, including final stabilization, which may include the application of hydroseeding or other measures.
 - J. Installation of erosion protection and bedding materials as engineered materials are described in Section 31 05 00 - Materials for Earthwork and Section 31 23 00 – Excavation and Fill Placement.
- 3.2 CONSTRUCTION ROADS
- A. Table 2 summarizes the various construction road types across the project areas.

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Table 2 – List of KRRP Construction Roads

| Project Site | Temporary Construction Road | Rehabilitated Construction Road | Permanent Construction Road |
|--------------|---|-----------------------------------|------------------------------------|
| J.C. Boyle | Left Bank Access Road | Scour Hole Access Road (Optional) | Powerhouse Access Road Realignment |
| | Left Disposal Haul Road | Penstock Access Road (Optional) | - |
| | Right Disposal Haul Road | - | - |
| Copco No.1 | Workpad Road (Stage 1) | Powerhouse Access Road Widening | Powerhouse Access Road Realignment |
| | Workpad Road (Stage 2) | - | - |
| Copco No.2 | - | Diversion Dam Access Road | Spillway Apron Access Road |
| | - | Left Bank Access Road (Optional) | - |
| Iron Gate | Downstream Diversion Tunnel Access Road | - | - |
| | Powerhouse Haul Road | - | - |
| | Spillway Haul Road | - | - |
| | Disposal Site #1 and #2 Haul Roads | - | - |

- B. For all construction roads, measures shall be installed to reduce sediment laden runoff to surrounding construction areas and the Klamath River. Diversion berms or, in some cases safety berms, are to be constructed on the downstream side of road to trap sediment during rain events. All drainage paths, whether existing or constructed, shall be clear of debris throughout the deconstruction. Gravel bag check dams are to be installed along drainage paths near and downstream of borrow areas to trap sediment during rainfall events. All culverts, existing or constructed, shall have their inlets protected by gravel bags or similar.

3.3 CONSTRUCTION SCHEDULING

- A. Under the accelerated deconstruction schedule, it may be necessary to select final erosion control measures in the field, with oversight of the QSP/CPESC. The QSP/CPESC generally maintains a toolbox of possible solutions that may be implemented under special circumstances. Such toolbox is described in the reference standards.
- B. Construction of erosion and sedimentation control measures are to be completed in accordance with the Erosion and Sediment Control Plan in Oregon, SWPPP in California, the Drawings, and these Specifications.

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C. Accelerated Scheduling:

1. Scheduling of the construction of temporary and permanent erosion and sedimentation control measures is to be completed by the Contractor.
2. Required erosion and sediment control measures, where applicable, are to be constructed prior to clearing, construction and/or demolition activities.
3. Accelerated scheduling shall be addressed in the CA SWPPPs and the OR Erosion and Sediment Control Plan.

D. Rain Event Action Plan (REAP)

1. In general, deconstruction will be accelerated so that permanent stabilization occurs relatively quickly and during the dry summer months, such that some temporary BMP's may be unnecessary. This is unique to the nature and mission of this project.
2. The requirement for REAP BMPs, if any, will be specified in the CA SWPPPs and OR Erosion and Sediment Control Plan.
3. If high fines materials are placed in a disposal area prior to a rain event (before permanent stabilization can be reached), they shall be stabilized with temporary BMPs including geotextile and mats or tackifier.
4. If permanent stabilization of the disposal areas can not be reached prior to a forecasted qualifying rain event, temporary BMP's will be deployed such that stormwater pollution will be prevented at a maximum extent practicable. Such temporary BMP's that will be considered include, but not limited to: Geotextile and mats and/or tackifier for slope protection, slope drains to divert concentrated flows, gravel bag check dams and other BMP's designated by the QSP or CPESC at the time the REAP inspection is conducted, if any.

3.4 CONVERSION OF TEMPORARY MEASURES TO PERMANENT MEASURES

A. Temporary measures may be converted to permanent measures, where accepted by the QSP/CPESC. As and where practical, temporary diversion berms, drainage paths/ditches, biodegradable gravel bag check dams, and sediment traps shall be converted to permanent measures, and will form part of the documentation for closure of the construction permits. Such conversion shall require the following:

1. Inspection by the Engineer and QSP/CPESC.
2. Removal and replacement of damaged measures.
3. Cleaning of sediment traps where the accumulated sediment is more than one-third the depth up to the overflow elevation. Sediment collected will be disposed of in designated areas.
4. Other measures in accordance with specific field conditions.

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3.5 TEMPORARY MEASURES

- A. Maintain all temporary erosion and sediment control structures during the Work or until the permanent erosion and sediment control structures are installed.
- B. Temporary measures are to remain in place until completion of construction activities and appropriate permanent measures are in place. The Contractor is responsible for the removal of all temporary measures, unless converted to permanent measures as outlined above.
- C. Construction access roads, where practical, will utilize the remnants of construction roads that were developed during the original construction.

3.6 PERMANENT MEASURES

- A. Fill locations must be stabilized by either of two methods: vegetative or non-vegetative as described in the California Stormwater BMP Handbook and the Oregon Construction Stormwater Best Management Practices Manual.
 - 1. Vegetative grade stabilization involves hydroseeding, as shown on the Drawings. Seeding of designated areas shall be carried out upon completion of construction or disposal work and after any required reclamation work has been completed.
 - 2. Non-vegetative stabilization involves providing rock slope protection or a gravel mulch protection, as shown on the Drawings.

3.7 SITE DEWATERING AND WATER CONTROL

- A. Refer to Section 31 23 00 – Excavation and Fill Placement.
- B. The Contractor shall be responsible for dewatering excavations and the Worksite by the control of groundwater and/or river or stream diversion where required to complete the Work.
- C. Where possible install collection swales downstream of the Worksite to collect sediment laden runoff.
- D. Where possible install diversion swales upstream of the Worksite to divert runoff before contact.
- E. Where appropriate, control the discharge of collected/diverted water and provide energy dissipation.
- F. Care of water must meet permit requirements, Section 31 80 00 – Care of Water requirements and comply with the Contract Documents.

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3.8 INSPECTION AND MAINTENANCE

- A. The Contractor shall regularly inspect and maintain the construction site for the control measures identified in the Erosion and Sediment Control Plan for Oregon or the SWPPP for California. As a minimum, the Contractor shall inspect temporary infrastructure on a daily basis during periods of prolonged rainfall. The Contractor shall identify corrective actions and time frames to address any damaged measures or reinstate any measures that have been discontinued. The CA SWPPPs and OR Erosion and Sediment Control Plan is to provide further details on BMP inspection requirements.
- B. If the Engineer or QSP/CPESC identifies a deficiency in the deployment or functioning of an identified control measure, the deficiency shall be corrected in a timely manner. If the permitting agency identifies a deficiency in the deployment or functioning of an identified control measure, the Contractor will be notified, and the deficiencies shall be corrected by the Contractor in a timely manner.

END OF SECTION 31 25 00