PROJECT SPECIFICATIONS

Elk Lick Dam Decommissioning and Restoration

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Project Specifications

Elk Lick Dam Decommissioning and Restoration

1. General Requirements

1.1. Project Information

1.1.1. Project Identification: Elk Lick Dam Decommissioning & Restoration

1.1.2. Project Location: N39.052018, E -79.669349

1.1.3. No work shall be performed on weekends or federal holidays without written permission from the Contracting Officer (CO)

1.1.4. Period of performance: 365 Days

1.1.5. All construction equipment will be cleaned and free of dirt, debris and plant materials. All equipment will be inspected by the Contracting Officer Representative (COR) before mobilization. A minimum of five day notice must be given to COR to schedule inspection.

1.1.6. Contractor is responsible for all damages to roads, drainage structures, bridges, and facilities. Contractor will repair any damages incurred at the contractor's expense in accordance with FP-14 specifications.

1.1.7. Temporary closures of FR701 may occur as needed. Coordination with the COR and approval must be obtained prior to any closure. A traffic control plan must be submitted at least 15 days before the start of construction for COR approval.

1.1.8. Forest Service will be responsible for instream and Section 404 permits. Contractor will be responsible for any haul or other required permits.

1.1.9. No utilities have been identified at the project location. Contractor is responsible for verifying this with local utility companies prior to starting construction. The dam was once used as water supply for the city of Parsons, WV. An abandoned water line exists downstream of the dam. Any protrusions of the water line out of the ground should be removed inside the limit of work.

1.2. Summary of Work

1.2.1. Work consists of decommissioning the Elk Lick Dam (also known as Parsons Reservoir) and restoring a stable stream channel through the former reservoir footprint. Major work includes clearing and grubbing; preparation of upstream and downstream laydown and access areas; temporary access road improvements and stream crossings; staged reservoir drawdown; temporary low-flow bypass installation; staged controlled breach of the concrete dam; removal of downstream apron and appurtenant concrete within breach limits; removal and disposal or approved on-site reuse of concrete debris; on-site sediment excavation, management, and grading; downstream turbidity-control reach construction; restored channel construction; grade control and riprap stabilization; optional large wood structures where shown on the plans; erosion, sediment, and water-quality control; and final stabilization and revegetation.

1.2.2. Base bid work shall include a 30-foot breach. Additional 10-foot breach widening and associated restoration may be included as optional bid items. Optional in-stream woody debris placement may also be included as shown on the plans.

1.2.3. Payment for the work described in this section shall be made under the applicable bid items in the Schedule of Items. Work not specifically identified as a separate bid item shall be incidental to the related pay item.

1.3. Objective and Background

The Elk Lick Dam Decommissioning & Restoration Project involves the removal of a portion of the existing concrete gravity dam and restoration of a stable stream channel through the former reservoir footprint. The dam currently impounds a small headwater tributary within the Monongahela National Forest. The structure has reached the end of its service life and no longer provides operational or recreational benefit. The project will restore natural stream continuity, eliminate long-term dam safety concerns, and improve aquatic habitat connectivity.

1.4. Dam Description

1.4.1. The existing structure is a concrete gravity dam constructed across a narrow valley. The dam is approximately:

1.4.1.1. Height: 18 ft effective height above bedrock

1.4.1.2. Crest Elevation: 2148 ft

1.4.1.3. Foundation Elevation: 2130 ft

1.4.1.4. Dam Base Width: 16 ft

1.4.1.5. Crest Width: 4 ft

1.4.1.6. Total Length: 156 ft

1.4.1.7. Apron Width: 10 ft

1.4.1.8. Apron Thickness: 4 ft

1.4.1.9. Apron Length: 156 ft

1.4.2. The downstream face of the dam includes a concrete spillway section that discharges onto a concrete splash apron extending downstream of the dam toe.

1.4.3. The structure was historically equipped with outlet works; however, the outlet system is currently non-functional and has not been operable for several decades. As a result, reservoir sediment has accumulated behind the dam, and the reservoir pool cannot be actively managed through controlled outlet operation.

1.4.4. Dam removal will include demolition of a central section of the dam and apron structures to create a permanent channel opening through the former dam alignment.

1.5. Reservoir Description

1.5.1. The reservoir created by the dam currently covers approximately 1.8 acres at normal pool. The reservoir extends approximately 600 ft upstream of the dam within a confined valley corridor.

1.5.2. The valley side slopes have a grade of approximately 76% and are densely forested, limiting lateral access to the reservoir margins. The water level is approximately 31 ft below the road surface that runs parallel to the reservoir. Existing access to the site is primarily provided by a forest road located downstream of the dam and by an old access route located near the upstream extent of the reservoir.

1.5.3. The reservoir bottom has gradually been filled with sediment over the decades since construction. Field observations and diver probing indicate that sediment depth near the dam may exceed 14 ft in thickness and decrease gradually upstream from the dam. The reservoir was last drained and cleaned out in 1983.

1.6. Reservoir Sediment Conditions

1.6.1. Sediment within the reservoir is composed of fine silts, sands, organic detritus, and decomposed vegetative material accumulated over several decades of impoundment. No geotechnical report is currently available for the dam area; however, hard bedrock is known to underlie the accumulated silt and support the dam foundation.

1.6.2. The lower portions of the reservoir, particularly near the dam, contain highly saturated organic deposits ("muck"). Diver observations indicate that these deposits are low density, gas charged and exhibit buoyant behavior when disturbed. These sediments are expected to possess:

1.6.2.1. Low shear strength

1.6.2.2. High water content

1.6.2.3. Slow drainage characteristics

1.6.2.4. Limited bearing capacity for construction equipment until partially drained

1.6.2.5. High probability of Hydrogen Sulfide and other nuisance gases being released from the decomposing materials

1.6.3. Because the outlet works have been nonfunctional for approximately 40 years, sediment accumulation has continued without interruption. Uncontrolled dam removal could mobilize a large volume of fine sediment; therefore, the project design incorporates staged drawdown and controlled breaching to minimize sudden sediment release.

1.6.4. Sediment thickness is expected to vary throughout the reservoir, with shallower deposits toward the upstream end and deeper, more organic material concentrated near the dam. The sediment at the center of the dam is estimated to be 14 feet thick. Even where sand is present within the profile, the material is expected to remain saturated and intermixed with organics, reducing strength and increasing the likelihood of instability during excavation.

1.6.5. The Contractor shall assume that sediment excavated from the channel corridor will behave as saturated, unstable material. Excavation methods shall be staged to maintain equipment stability and to prevent uncontrolled sediment movement.

1.6.6. All excavation and sediment handling shall be performed so that disturbed material remains within the reservoir footprint. Sediment shall not be placed where it may enter the active stream channel or migrate downstream. Sediment placement locations must be accessible from stable working surfaces and within typical excavator reach; placement in areas that cannot be safely graded and stabilized is not permitted.

1.6.7. Where sediment is placed adjacent to the constructed channel, the Contractor shall grade the material to stable slopes and prevent sloughing or raveling into the channel corridor. Excessively steep or unsupported sediment margins will not be allowed.

1.6.8. If field conditions differ from the sediment characteristics described above, the Contractor shall notify the COR prior to continuing excavation so that excavation limits and placement procedures can be reassessed.

1.7. Construction Flow Characteristics

1.7.1. Elk Lick Run is a small headwater stream with relatively low ordinary flow and a flashy runoff response typical of a steep, confined watershed. Stream assessment data indicate a bankfull channel width of approximately 22.5 feet, a bankfull depth of about 1.5 feet, and a bankfull discharge of approximately 113 cfs. The flood-prone width has been estimated at approximately 80 feet. Ordinary flow conditions are expected to be much lower than bankfull.

1.7.2. For the June 1 through September 30 construction window, available StreamStats seasonal low-flow information indicates that Elk Lick Run is expected to carry very low ordinary summer flows. On that basis, a 24-inch temporary bypass appears adequate for expected low-flow conditions during construction. Its adequacy is not controlled by ordinary low flow, but rather by storm events, overtopping, debris, and temporary stabilization during construction.

1.7.3. Construction Staking and Clearing Limits

1.7.3.1. The Contractor shall stake or otherwise clearly mark the limits of clearing, grubbing, access improvement, laydown areas, stockpile areas, channel excavation, breach limits, downstream turbidity-control reach, and other principal work features prior to beginning disturbance in those areas.

1.7.3.2. Clearing limits shall be marked on trees to remain standing, on stakes, or on lath at intervals sufficient to make the limits clearly visible in the field.

1.7.3.3. No clearing, grubbing, excavation, or material placement shall occur outside the marked limits unless approved by the COR.

1.7.3.4. Any work outside approved limits shall be repaired or restored at no additional cost to the Government.

1.7.3.5. Payment is incidental to Bid Item A5 Survey, layout, staking, as-builts.

1.8. Design Flow

For design purposes, the restored channel was evaluated relative to the stream's bankfull and larger flood events. StreamStats estimates the approximately 2-year event at about 115 cfs, which is consistent with the assessed bankfull discharge of approximately 113 cfs. The estimated 1-percent annual exceedance probability flood is 588 cfs. The probable maximum flood used for project evaluation is approximately 7,790 cfs.

1.9. Channel Capacity

The restored channel is intended to convey normal and moderate storm flows while allowing overbank flow across adjacent floodplain areas during larger events. Channel geometry is therefore designed to balance sediment transport capacity, channel stability, and floodplain connectivity.

1.10. Hydraulic transition at Dam

Removal of the dam structure will substantially reduce the existing hydraulic control created by the impoundment. Following removal, the restored channel will provide a continuous longitudinal profile through the former reservoir reach consistent with upstream and downstream channel conditions.

1.11. Reference:

1.11.1. U.S. Geological Survey StreamStats Report, Elk Lick Run below the dam, clicked point at Latitude 39.05265, Longitude -79.66948.

1.12. Contractor Facilities, Utilities and Communications

1.12.1. The Contractor shall provide all temporary facilities, utilities, services, and accommodations necessary to complete the work.

1.12.2. No electrical service is available at the project site. The Contractor shall provide generators, fuel for temporary power, lighting, battery charging, or other temporary power necessary for construction support, testing, communications, safety, and administrative needs.

1.12.3. No potable water, sanitary sewer, restroom facilities, or bathroom facilities are available at the project site. The Contractor shall provide temporary sanitary facilities, handwashing facilities, potable water, and any other worker-support facilities required by applicable law, regulation, permit, or safety requirement.

1.12.4. Cell phone service at the project site is limited, unreliable, or unavailable. The Contractor shall not rely on cellular service as the sole means of routine or emergency communication. The Contractor shall provide an appropriate communication plan and equipment necessary for routine communication, emergency communication, coordination with the COR, and worker safety.

1.12.5. The Contractor shall maintain temporary facilities in a clean, safe, sanitary, and secure condition. Temporary facilities shall be located only in approved staging or laydown areas and shall not obstruct access, drainage, construction sequencing, erosion-control measures, or public use areas unless approved by the COR.

1.12.6. The Contractor shall remove all temporary facilities, utilities, sanitary facilities, waste, and related materials from the site before final acceptance unless otherwise approved by the COR.

1.12.7. Measurement and Payment

1.12.7.1. Temporary facilities, sanitary facilities, handwashing facilities, potable water, temporary power, generators, fuel for temporary power, lighting, battery charging, communication planning, communication equipment, maintenance of temporary facilities, and removal of temporary facilities shall be considered incidental to A1 Mobilization / Demobilization.

1.12.7.2. No separate payment will be made for providing, maintaining, relocating, servicing, or removing temporary facilities, utilities, sanitary facilities, temporary power, or communication equipment required to complete the work.

1.13. Site Access

1.13.1. Due to steep abutments adjacent to the dam, direct access from the reservoir to the dam crest is limited. As a result, dam demolition activities will occur primarily from the downstream side of the structure and from the reservoir bottom after dewatering.

1.13.2. Upstream and downstream access improvements, temporary stream crossings, temporary material storage and road maintenance are incidental to Bid Item A3, Temporary access improvements, crossings, mats, and work pads. Access-related erosion control is incidental to Bid Item A4 Erosion & sediment controls, installation and maintenance.

1.14. Downstream Access

1.14.1. The primary construction access route originates from an existing forest road located approximately 735 ft downstream of the dam. This road crosses the stream channel downstream of the dam and will require improvement to accommodate construction equipment and truck traffic.

1.14.2. A temporary stream crossing will be required. Provide and install temporary articulated concrete block (ACB) mats designed for vehicular loadings equal to or greater than the heaviest project construction equipment. Mats shall be installed on exposed rock with a geotextile underlayment and shall be fully removable. Installation, anchoring, maintenance, and removal shall conform to the manufacturer's recommendations. The Contractor shall prevent displacement of the mats during use and shall remove all mats, anchoring hardware, geotextile, and associated materials at the end of construction. The crossing area shall be restored to pre-construction condition upon removal.

1.14.3. Access improvements will include widening the existing road corridor to approximately 12 ft, localized grading, and the installation of temporary surfacing where required.

1.14.4. A downstream staging, laydown, and water management area will be cleared near the dam toe to allow equipment mobilization and temporary material storage.

1.15. Upstream Access

1.15.1. A secondary access route exists near the upstream extent of the former reservoir area. This route is 715 ft long and will allow construction equipment to access the reservoir footprint following initial reservoir drawdown.

1.15.2. A temporary stream crossing will be required. Provide and install temporary ACB mats designed for vehicular loadings equal to or greater than the heaviest project construction equipment. Mats shall be installed on exposed rock with a geotextile underlayment and shall be fully removable. Installation, anchoring, maintenance, and removal shall conform to the manufacturer's recommendations. The Contractor shall prevent displacement of the mats during use and shall remove all mats, anchoring hardware, geotextile, and associated materials at the end of construction. The crossing area shall be restored to pre-construction condition upon removal.

1.16. Construction Access Strategy

1.16.1. Because of the steep abutments and narrow crest width, equipment will not operate directly on the dam crest during demolition. Instead, construction access will rely on a combination of:

1.16.1.1. Downstream access and staging area for dam demolition operations.

1.16.1.2. Upstream access along the former reservoir floor for channel restoration work.

1.16.1.3. Temporary access along the channel corridor following initial drawdown.

1.16.1.4. Following reservoir drawdown and partial sediment consolidation, construction equipment will enter the reservoir footprint from the upstream access route and progress downstream during channel construction. This approach minimizes disturbance to unstable sediment near the dam and allows channel restoration work to proceed toward the breach location.

1.17. Laydown Areas

Three Laydown areas are identified for material staging, equipment, and other construction needs. Payment for clearing, grubbing, and handling is incidental to Bid Item A2 Clearing, grubbing, tree removal / salvage handling. Clearing and Grubbing will be required at these sites. The area is approximately .5 acres in total size between the three locations. The upstream location is approximately .12 acres, downstream is approximately .26 acres and the area located near the equipment sheds is approximately .12 acres. Cleared woody debris shall be stockpiled and reused within the reservoir as stream restoration features. Note, in some cases root wads will be required to be salvaged and reused.

1.18. General Material Handling, Salvage, Reuse and Disposal

1.18.1. General

1.18.1.1. The Contractor shall handle, sort, salvage, reuse, stockpile, remove, and dispose of materials generated by the work in accordance with this section and the specific requirements of the applicable work sections.

1.18.1.2. Materials generated by the work may include, but are not limited to, concrete, stone, soil, sediment, rock, woody material, brush, slash, pipe, metal, abandoned utility materials, trash, debris, and unsuitable material.

1.18.1.3. Materials suitable for approved reuse on site shall be salvaged and reused to the maximum extent practical where shown on the drawings specified herein, or approved by the COR. Materials not suitable or not approved for reuse shall be legally disposed of offsite unless otherwise approved by the COR.

1.18.2. Contractor Responsibility

1.18.2.1. The Contractor shall be responsible for all handling, loading, hauling, temporary stockpiling, sorting, processing, reuse, and disposal of materials generated by the work. The Contractor shall conduct all material handling and disposal activities in accordance with applicable federal, state, and local laws and regulations; permit conditions; project drawings; erosion-control requirements; and directions from the COR. The Contractor shall not bury, dump, spread, burn, abandon, or otherwise dispose of material on National Forest System lands unless specifically allowed by the specifications, shown on the drawings, or approved by the COR.

1.18.3. Salvage and Reuse Priority

1.18.3.1. The preferred order of material handling shall be:

1.18.3.2. Salvage and reuse suitable material in the work

1.18.3.3. Stockpile suitable material for later approved use

1.18.4. Use suitable excess material on site for approved restoration, stabilization, access-road restoration, grading, slope roughening, or closure feature

1.18.5. Recycle material off site where practical and lawful

1.18.6. Legally dispose of unsuitable or excess material off site

1.18.7. The contractor shall not dispose of, chip, crush, bury, or otherwise discard material suitable for reuse until the material has been reviewed and approved for disposal by the COR

1.18.8. On Site Reuse

1.18.8.1. Reuse of suitable woody material for stream restoration, racking material, toe roughness, slope roughening, access-road restoration, or habitat features

1.18.8.2. Reuse of approved broken concrete in designated downstream work platform fill areas, shall be free of rebar and crushed into pieces not larger than 12” with a minimum of 18” of cover.

1.18.8.3. Incidental to Bid Item A3 Temporary access improvements, crossings, mats, and work pads.

1.18.8.4. Reuse of suitable excavated soil, rock, or stone for backfill, grading, stabilization, or restoration

1.18.8.4.1. Reuse of excess brush or slash for approved upland restoration or closure features

1.18.8.4.2. Use of non-erodible material for backfilling removed structures, abandoned utilities, or scour areas

1.18.9. Unsuitable Material

1.18.9.1. Unsuitable material shall be separated from salvageable or reusable material and handled as directed by the COR. Unsuitable material includes, but is not limited to:

1.18.9.2. Trash, garbage, and construction debris

1.18.9.3. Treated lumber, pallets, dimensional lumber, and manufactured wood products

1.18.9.4. Concrete containing rebar, wire mesh, metal, asphalt, trash, petroleum contamination, or other deleterious material unless cleaned and approved for reuse

1.18.9.5. Pipe, valves, fittings, wire, cable, metal, and abandoned utility materials not approved for reuse

1.18.9.6. Petroleum-contaminated material or material with evidence of chemical contamination

1.18.9.7. Excessively organic material, muck, roots, stumps, duff, and vegetation not approved for restoration reuse

1.18.9.8. Material containing invasive species where spreading is a concern

1.18.9.9. Rotten, unstable, or decomposed material unsuitable for the intended use

1.18.9.10. Other material determined unsuitable by the COR.

1.18.10. Unsuitable material shall not be incorporated into structural fill, channel backfill, embankments, access-road fills, concrete reuse areas, or restoration features unless specifically approved by the COR for that use.

1.18.11. Temporary stockpiles shall be located only in approved laydown areas. Stockpiles shall be placed, shaped, and maintained to prevent erosion, sediment discharge, slope instability, obstruction of drainage, damage to vegetation outside the limits of disturbance, and interference with construction sequencing or access. Stockpiles shall not be placed in flowing water, wetlands, ponded areas, active drainageways, constructed stream channels, bypass channels, or locations where material may be mobilized by storm flow unless specifically approved by the COR. The Contractor shall segregate stockpiles by material type where necessary to preserve salvage value and prevent contamination of reusable material. Stockpiled reusable material shall be protected from contamination by trash, unsuitable material, sediment, fuel, oil, or other deleterious substances.

1.18.12. Off Site Disposal

1.18.12.1. Material not reused on site or not approved for on-site placement shall be removed from the project area and legally disposed of at an approved off-site disposal, recycling, or processing facility.

1.18.12.2. The Contractor shall be responsible for all loading, hauling, disposal, recycling, tipping fees, permits, approvals, and documentation required for off-site disposal.

1.18.12.3. Upon request, the Contractor shall provide the COR with documentation identifying the disposal or recycling facility used for off-site disposal.

1.18.12.4. Off-site disposal shall comply with applicable federal, state, and local requirements.

1.18.13. Burning

1.18.13.1. Burning of cleared material, woody debris, slash, or other waste material shall not be permitted unless specifically authorized in writing by the COR.

1.18.13.2. If burning is authorized, it shall be conducted in accordance with applicable federal, state, local, and Forest Service requirements, including fire restrictions, permits, smoke-management requirements, and any required burn plan.

1.18.14. Protection of Waters and Drainageways

1.18.14.1. The Contractor shall conduct material handling, stockpiling, reuse, and disposal activities in a manner that prevents material from entering streams, wetlands, ponded areas, bypass channels, drainageways, or other waters unless specifically authorized as part of the work.

1.18.14.2. The Contractor shall immediately remove any unauthorized material that enters flowing water, wetlands, drainageways, or areas outside approved limits, unless removal would cause greater disturbance and the COR directs otherwise.

1.18.15. Correction of Unauthorized Disposal or Placement

1.18.15.1. Material placed, buried, dumped, spread, or disposed of outside approved limits or in a manner inconsistent with the specifications shall be removed, relocated, or corrected by the Contractor at no additional cost to the Government.

1.18.15.2. Unauthorized disposal of suitable material designated or suitable for reuse may require replacement with equivalent material at no additional cost to the Government.

1.18.16. Measurement and payment

1.18.16.1. Material handling, sorting, salvage, temporary stockpiling, on-site reuse, loading, hauling, recycling, disposal, tipping fees, documentation, and cleanup shall be incidental to the applicable Bid Items that generate the material.

1.18.16.2. No separate payment will be made for unauthorized disposal, rehandling caused by improper sorting or stockpiling, correction of improperly placed material, replacement of reusable material disposed of without approval, or removal of material placed outside approved limit.

2. Site Preparation and Earthwork

2.1. Clearing, Grubbing, Salvage, and On-Site Use of Woody Material

2.1.1. Contractor is responsible for all survey, layout and staking prior to any clearing or earthwork, incidental to Bid Item A5 Survey, layout, staking, as-builts.

2.1.2. The Contractor shall clear and grub the areas shown on the drawings or designated by the COR. Clearing and grubbing shall include removal of trees, saplings, brush, stumps, roots, downed woody material, surface vegetation, and other organic material necessary to complete the work.

2.1.3. Clearing and grubbing shall be limited to the minimum area necessary for access, staging, dam removal, channel construction, sediment handling, bypass installation, and restoration work. No clearing shall occur outside the approved limits without written authorization from the COR.

2.1.4. Before clearing begins, the Contractor shall meet with the COR to review:

2.1.4.1. Clearing limits

2.1.4.2. Trees to be protected

2.1.4.3. Trees and woody material to be salvaged

2.1.4.4. Stockpile locations

2.1.4.5. Access routes

2.1.4.6. Disposal and on-site reuse methods

2.1.4.7. Areas where grubbing is required

2.1.4.8. Areas where cutting flush is acceptable.

2.1.4.9. The Contractor shall mark the limits of disturbance prior to clearing. Trees and vegetation outside the approved disturbance limits shall be protected from unnecessary damage.

2.1.5. Salvageable Woody Material

2.1.5.1. The Contractor shall salvage woody material suitable for use in the restoration work. Salvaged material may include whole trees, logs, root wads, trunks, limbs, crowns, brush, slash, and other woody material generated from clearing and grubbing.

2.1.6. Key Large Wood

2.1.6.1. Key large wood pieces shall generally consist of sound whole trees, trunks, or logs suitable for use as structural or semi-structural restoration elements within the optional cross valley log jams and wood deflectors.

2.1.6.2. Key large wood should generally meet the following criteria:

2.1.6.2.1. Minimum approximate diameter: 10 inches

2.1.6.2.2. Preferred diameter: 12 inches or greater

2.1.6.2.3. Minimum length: 12 feet

2.1.6.2.4. Preferred length: 15 to 30 feet, or as long as can be safely handled and placed

2.1.6.2.5. Wads preferred where available

2.1.6.2.6. Forks, irregular trunks, crowns, and attached limbs preferred over clean, straight sawlogs.

2.1.6.2.7. Key large wood shall be stockpiled separately from brush, slash, and unsuitable material.

2.1.7. Root wads

2.1.7.1. Root wads shall be salvaged where practical. Root wads with attached trunk sections are preferred. Root wads shall be handled in a manner that preserves the root mass and attached woody structure to the extent practical.

2.1.7.2. Root wads containing excessive soil, rock, trash, metal, or other unsuitable material may be rejected or directed to be cleaned, trimmed, or used only in approved upland locations.

2.1.8. Racking Material

2.1.8.1. Racking material shall include smaller logs, limbs, tops, crowns, and irregular woody material suitable for placement around larger wood features.

2.1.8.2. Racking material may include:

2.1.8.3. Limbs generally 2 inches diameter and larger

2.1.8.4. Tree tops and crowns

2.1.8.5. Small logs

2.1.8.6. Forked or irregular branches

2.1.8.7. Shorter wood pieces that are not large enough to function as key large wood.

2.1.8.8. Racking material shall be reasonably clean and free of excessive soil, trash, and construction debris.

2.1.8.9. Brush and Slash

2.1.9. Brush and slash may be used for:

2.1.9.1. Toe roughness

2.1.9.2. Void filling around larger wood

2.1.9.3. Material

2.1.9.4. Brush packing

2.1.9.5. Temporary sediment and erosion control

2.1.9.6. Slope roughening

2.1.9.7. Access-road restoration

2.1.9.8. Habitat complexity

2.1.9.9. Other approved restoration uses.

2.1.10. Brush and slash shall not be substituted for required key large wood unless approved by the COR.

2.1.11. Material to Be Retained

2.1.11.1. Unless otherwise directed by the COR, the Contractor shall retain the following material generated within the clearing and grubbing limits:

2.1.11.2. All sound trees 10 inches diameter and larger suitable for restoration use

2.1.11.3. All salvageable root wads

2.1.11.4. All sound logs 8 inches diameter and larger and at least 8 feet long

2.1.11.5. Tree crowns and limbs suitable for racking material

2.1.11.6. Brush and slash suitable for toe packing, bank roughness, erosion control, slope roughening, or restoration features

2.1.11.7. Naturally downed woody material within the disturbance area if sound and usable.

2.1.11.8. The Contractor shall not chip, burn, remove from site, bury, or otherwise dispose of woody material suitable for restoration until the material has been reviewed and approved for disposal or reuse by the COR.

2.2. Insufficient Woody Material

2.2.1. The Government anticipates that woody material generated from clearing and grubbing will be used as the primary source of large wood, root wads, racking material, brush, and slash for the restoration work.

2.2.2. If sufficient suitable woody material is not generated from the approved clearing and grubbing limits, the Contractor shall notify the COR before importing, substituting, disposing of, or omitting woody material.

2.2.3. In the event of insufficient woody material, the Government will identify and provide additional tree locations within or near the project area for use in the work. The Contractor shall not cut trees outside the approved clearing limits unless the additional tree locations have been designated and approved by the COR.

2.2.4. Additional trees designated by the Government shall be cut, salvaged, handled, stockpiled, and incorporated into the work in accordance with this specification.

2.2.5. Stockpiling Requirements

2.2.5.1. Salvaged wood shall be stockpiled in approved locations within the project limits. Stockpiles shall be separated by material type as follows:

2.2.5.1.1. Large wood / key pieces

2.2.5.1.2. Root wads

2.2.5.1.3. Racking material

2.2.5.1.4. Brush and slash

2.2.6. Unsuitable organic debris

2.2.6.1. Stockpiles shall not be placed in flowing water, wetlands, active drainageways, ponded areas, or locations where material may be mobilized by storm flow. Stockpiles shall not block access roads, bypass routes, sediment-control features, construction sequencing, or emergency access.

2.2.6.2. The Contractor shall handle salvaged wood in a manner that preserves root wads, limbs, crowns, and irregular features to the extent practical.

2.3. On-Site Use of Excess Material

2.3.1. Woody material not needed for direct placement within the constructed channel or restoration features shall be reused on site to the maximum extent practical, as approved by the COR. On-site use shall not create drainage obstructions, unstable piles, floatable debris hazards, public safety hazards, or conditions that may cause material to enter the active channel during storm events. Woody material used outside the constructed channel shall be placed above ordinary high water unless otherwise approved. Material shall be spread, arranged, keyed, or stabilized as necessary to prevent mobilization.

2.3.2. Excess brush, slash, stumps, roots, and non-structural wood may be used on site for:

2.3.2.1. Slope roughening

2.3.2.2. Erosion control

2.3.2.3. Access-road decommissioning

2.3.2.4. Habitat piles above ordinary high water

2.3.2.5. Mulch or scattered slash outside constructed channel areas

2.3.2.6. Filling voids in restoration areas where approved

2.3.2.7. Restoration of disturbed upland areas

2.4. Unsuitable Material

2.4.1. The following material shall not be used as restoration woody debris:

2.4.1.1. Rotten or punky wood that breaks apart during handling

2.4.1.2. Excessively small twigs, leaves, duff, and loose forest litter

2.4.1.3. Stumps or root masses containing excessive soil, rock, trash, wire, metal, or construction debris

2.4.1.4. Wood containing nails, hardware, fencing, wire, cable, or other embedded metal

2.4.1.5. Invasive species material where spreading is a concern

2.4.1.6. Other deleterious material determined unsuitable by the COR.

2.4.2. Payment shall be incidental to Bid Item A2 Clearing, grubbing, tree removal / salvage handling.

2.5. Disposal and Final Handling of Remaining Material

2.5.1. The preferred method of disposal for excess cleared and grubbed material is beneficial on-site use. The Contractor shall use excess woody material on site where practical and where approved by the COR.

2.5.2. Material not incorporated into stream restoration features may be used on site for slope roughening, erosion control, access-road restoration, habitat piles, scattering in upland disturbed areas, or other approved uses.

2.5.3. Material shall not be placed in the constructed stream channel, bypass channel, wetlands, ponded areas, concentrated drainageways, or areas where it may be transported downstream unless specifically approved as part of a restoration feature.

2.5.4. Organic material, stumps, roots, slash, brush, topsoil, and other deleterious material shall not be buried in structural fill, channel embankments, access-road fills, dam breach backfill, or other constructed features unless specifically shown on the drawings or approved for habitat or restoration use.

2.5.5. If material cannot be reused on site and is not suitable for approved restoration, erosion-control, or upland placement, the Contractor shall notify the COR for direction. Off-site disposal shall not occur unless approved by the COR.

2.6. Protection of Salvaged Material

2.6.1. Woody material generated from clearing and grubbing is considered Government-furnished project material intended for beneficial reuse in the restoration work.

2.6.2. The Contractor shall not remove, chip, burn, bury, or dispose of suitable woody material without prior approval. Suitable material shall be segregated, protected, and made available for incorporation into the work.

2.6.3. Disposal of suitable woody material without approval may require replacement with equivalent material at no additional cost to the Government.

2.6.4. Measurement and Payment

2.6.4.1. Payment for clearing, grubbing, salvage, stockpiling, on-site use, and handling of woody material shall be made under the applicable bid item A2. Installation of Woody Debris Features are incidental to E3-Option Cross-valley log jams and E4-Option Wood Deflector as applicable.

2.7. Demolition

2.7.1. Dam Demolition and Temporary Working Platforms

2.7.1.1. Concrete demolition within the base 30-foot breach shall be paid under Bid Item C1 Base breach demolition and formation (first 30 LF), Dam Demolition – Base Breach (30 LF). Concrete haul and disposal should be paid under Bid Items C2 Concrete / masonry haul (off site and C3 Concrete / masonry disposal fee (off site. Temporary working platforms and construction mats should be incidental to Bid Item A3 Temporary access improvements, crossings, mats, and work pads.

2.7.2. Limits of Demolition

2.7.2.1. Concrete demolition shall be limited to the breach opening and other areas identified in the plans. Base bid breach opening shall be 30 feet wide with additional wider options.

2.7.2.2. The Contractor shall remove the concrete dam structure within the breach limits down to the channel invert elevation shown on the drawings. Concrete foundation elements keyed into bedrock may remain in place where removal would require excessive excavation into rock or where removal is not necessary for channel construction.

2.7.3. Demolition Methods

2.7.3.1. Concrete demolition shall be performed using controlled mechanical methods. Acceptable methods include drilling, hydraulic hammer attachments, hoe-ram breakers, saw cutting, or other mechanical demolition equipment.

2.7.3.2. Blasting shall not be permitted unless specifically approved in writing by the COR.

2.7.3.3. The Contractor shall conduct demolition in a controlled manner to avoid overbreak beyond the limits shown on the drawings.

2.8. Concrete Handling and Disposal

2.8.1. General

2.8.1.1. Broken concrete generated from demolition shall be handled, loaded, transported, and disposed of in accordance with this section. Concrete shall not be buried, placed, stockpiled, crushed, or reused on site except in locations and configurations approved by the COR.

2.8.1.2. Concrete crushing on site is not permitted unless specifically authorized in writing by the COR.

2.8.2. Off-Site Disposal

2.8.2.1. Broken concrete not approved for on-site reuse shall be loaded, transported off site, and legally disposed of at an approved disposal or recycling facility.

2.8.2.2. Concrete transported off site shall become the Contractor's responsibility and shall be disposed of in accordance with all applicable federal, state, and local requirements.

2.8.3. Placement, Void Filling, and Cover

2.8.3.1. Stone used on site for temporary work pads shall be covered with a minimum of 18 inches of suitable backfill material in areas intended for final soil cover and vegetation, unless otherwise shown on the drawings or directed by the COR.

2.8.3.2. Backfill material shall be soil or other approved material capable of supporting final grading, stabilization, and vegetation. Backfill shall be placed and graded to blend with adjacent ground and prevent ponding, erosion, or exposure of concrete.

2.9. Riprap, Armoring, and Scour Protection

2.9.1. Riprap or armoring shall be provided at a minimum at the upstream face, downstream face, toe areas, channel tie-ins, and other locations shown on the drawings or directed by the COR where concentrated flow, seepage, or future scour could occur.

2.9.2. Riprap shall be embedded, keyed, and graded to provide a stable transition to adjacent ground. Soil cover and vegetation may be placed over buried armoring where approved, provided the final surface is stable and not subject to active concentrated flow.

2.9.3. Concrete rubble shall not be used as exposed riprap or final channel armor unless specifically approved by the COR.

2.10. Final Grading and Restoration

2.10.1. The completed on-site reuse area shall be graded to drain and to prevent concentrated flow from cutting through or around the fill. Final grades shall blend with adjacent ground and shall not create unstable slopes, ponding, or preferential flow paths.

2.10.2. The completed area shall be stabilized and vegetated at the end of construction in accordance with the project restoration, erosion-control, and seeding requirements.

2.10.3. Areas subject to concentrated flow or scour shall receive riprap, erosion-control matting, or other approved stabilization in addition to seeding.

2.11. Payment

2.11.1. Off-site hauling, handling, transportation, disposal, recycling, tipping fees, and all other costs associated with concrete shall be incidental to Bid Items C2 Concrete / masonry haul (off site and C3 Concrete / masonry disposal fee (off site, as applicable.

2.12. Temporary Working Platforms

2.12.1. The downstream work platform area is estimated to need 200 CY of fill. Reused concrete may be applied to this location if approved by COR and in accordance with 1.18.8.2 above

2.12.2. General

2.12.2.1. Where sediment conditions limit equipment stability, the Contractor may utilize temporary working platforms including timber construction mats, laminated crane mats, or composite construction mats.

2.12.3. Construction Mat Requirements:

2.12.3.1. Construction mats shall be of sufficient size and thickness to distribute equipment loads and reduce settlement within saturated reservoir sediments.

2.12.3.2. Typical mat dimensions shall be approximately 8 feet wide by 14 to 20 feet long with a minimum thickness of 6 to 8 inches, or equivalent composite mat systems capable of supporting tracked excavators.

2.12.4. Temporary Working Platforms consisting of stone fill, articulated concrete mats or wooden construction mats will be incidental to A3 Temporary access improvements, crossings, mats, and work pads.

2.12.5. Installation and Use

2.12.5.1. Mats may be installed to create temporary working surfaces allowing excavation equipment to extend reach into the reservoir footprint for channel excavation and sediment placement.

2.12.5.2. Mats shall be advanced progressively as excavation proceeds and shall be installed in a manner that minimizes disturbance of reservoir sediments.

2.12.5.3. All temporary mats and working platforms shall be removed upon completion of channel excavation unless otherwise approved by the COR. Areas disturbed during mat placement or removal shall be graded and stabilized in accordance with the vegetation establishment specifications.

2.13. Temporary Access Road

2.13.1. Temporary construction access roads shall be constructed beginning at the downstream access point and continuing to the downstream outlet of the dam. From the downstream outlet, the access road shall extend upstream to the reservoir. The roads shall be designed and constructed to support dump trucks, excavators, and all associated construction equipment required for the project.

2.13.2. Previous access roads exist on both the upstream and downstream sides of the dam. These existing road alignments may be used where feasible; however, they shall be improved, regraded, or reconstructed as necessary to meet the required load bearing capacity and width for construction access.

2.13.3. Install drainage features and erosion control measures to prevent rutting and runoff related erosion. Maintain all access roads in a serviceable condition for the duration of the work.

2.13.4. Payment should be incidental to Bid Item A3 Temporary access improvements, crossings, mats, and work pads.

2.14. Downstream Laydown and Staging Area

2.14.1. A downstream laydown area shall be established to support equipment staging, truck turnaround, concrete handling, material storage, and water management facilities. The pad shall be cleared, graded, and stabilized.

2.14.2. Measured for payment under Bid Item A3, Temporary access improvements, crossings, mats, and work pads.

2.15. Reservoir Sediment Excavation and Grading

2.15.1. Reservoir channel excavation should be measured under Bid Item D1, Reservoir Channel Excavation to profile.

2.15.2. Sediment grading and redistribution shall occur within the drained reservoir footprint. Sediment shall remain on site unless otherwise directed. Material shall be placed outside the active restored channel corridor and graded to stable slopes.

2.15.3. Do not stockpile material in standing water or active flow.

2.15.4. Where practicable, allow sediments to drain and dry prior to rehandling.

2.15.5. Final side slopes shall be stable and blend with the restored corridor.

2.16. Pilot channel Excavation in Saturated Sediment

2.16.1. Where saturated reservoir sediment conditions prevent conventional broad excavation, the Contractor may excavate a pilot channel or pilot trench to initiate drainage, define alignment, and improve sediment consolidation. Equipment operations shall proceed from stable ground or previously improved work surfaces.

2.16.2. Pilot channel excavation should be incidental to Bid Item D1, Reservoir Channel Excavation to profile.

3. Reservoir Dewatering and Temporary Flow Control

3.1. Controlled Reservoir Drawdown

3.1.1. A detailed dewatering plan with all drawings and calculations will be provided to the COR for approval at least 15 days prior to the start of construction.

3.1.2. Reservoir drawdown shall occur in controlled increments of approximately 1–2 feet, with stabilization periods between stages. The Contractor shall monitor slopes, exposed sediment surfaces, and downstream turbidity during drawdown.

3.1.3. Do not proceed to the next drawdown stage if unstable sediment behavior or unacceptable turbidity is observed. Acceptable levels are listed in 8.2 below.

3.1.4. Route drawdown discharge to a stabilized discharge location.

3.1.5. Maintain records of drawdown stages and observations.

3.1.6. Payment for drawdown is incidental to Bid Item B1 Reservoir drawdown System.

3.2. Temporary Flow Bypass

3.2.1. Temporary 24-Inch Bypass with upstream weir, intake stabilization, outlet stabilization, and bypass protection should be incidental to Bid Item B2 Upstream temporary weir and 24-inch bypass . Standby pumping and bypass maintenance should be paid under Bid Item B4 Contingency pumping / bypass maintenance.

3.2.2. Baseflow shall be conveyed using a temporary gravity bypass pipe approximately 24 inches in diameter, or other Contractor-designed system with equivalent or greater capacity approved by COR.

3.2.3. Install the bypass within or immediately adjacent to the developing channel corridor.

3.2.4. Protect the bypass from traffic damage and flotation.

3.2.5. Provide intake and outlet stabilization.

3.2.6. The bypass is intended for baseflow management, not flood conveyance.

3.3. Storm Configuration

3.3.1. When storm flows are anticipated, the Contractor shall place the site in a storm-safe configuration. Temporary works that could trap flow or fail under higher discharge shall be removed, opened, or protected. Flow shall be routed through stabilized portions of the project to all extents practicable.

3.4. Turbidity Control Measures

3.4.1. Downstream turbidity-control reach construction with monitoring, logging, and adaptive response should be measured under Bid Item B3, Downstream temporary turbidity-control reach / flow controls. Temporary controls outside the downstream control reach should be incidental to Bid Item A4, Erosion & sediment controls, installation and maintenance.

3.4.2. Prior to initiating any construction activity that may result in flow passing through disturbed sediments, the breach area, the temporary bypass system, spoil areas, or any other portion of the work draining downstream, the Contractor shall install all temporary turbidity and sediment control measures necessary to minimize downstream sediment transport.

3.4.3. The Contractor shall prepare and submit a project-specific Turbidity and Sediment Control Plan for review and approval by the COR at least 15 calendar days prior to construction. The plan shall identify the temporary measures and sequencing necessary to control turbidity and sediment during bypass installation, reservoir drawdown, channel excavation, breach construction, spoil placement, concrete handling, final grading, and site stabilization.

3.4.4. The Turbidity and Sediment Control Plan shall emphasize passive and sequencing based measures to the maximum extent practicable including staged drawdown, staged breach progression, temporary flow routing, temporary stabilization, check structures, sediment containment features, spoil area controls, and routing of flow. Active treatment measures may be used but shall not be presumed to be the sole or primary means of turbidity control unless passive measures are shown to be inadequate.

3.4.5. Prior to initiating breach below the retained sediment surface, the Contractor shall establish and stabilize a downstream turbidity control reach extending from the dam to the approved downstream tie in point. This reach shall provide a controlled and stable path for flow exiting the breach and shall include such temporary grade control, check structures, flow transitions, armoring, stilling features, or other passive measures as necessary to minimize scour, sediment mobilization, and uncontrolled downstream transport. The downstream control measures shall extend across the full width of the existing stream channel and any disturbed portion of the flow path. The downstream turbidity-control reach shall be not less than 75 feet in length unless otherwise approved by the COR. To the maximum extent practicable, these measures shall be designed and placed such that they can remain in place and be incorporated into the final downstream restoration configuration. Woody debris, including logs or large wood features may be incorporated into the downstream turbidity control reach where approved by COR or in Contractor's plan provided such material is installed in a stable manner and does not reduce required hydraulic, grade control or sediment control function of the reach.

3.4.6. The Contractor shall not rely solely on downstream treatment devices or passive perimeter controls for turbidity management. The Turbidity and Sediment Control Plan shall demonstrate how breach sequencing, downstream stabilization, temporary flow routing, and staged construction will work together to minimize sediment release.

3.4.7. At a minimum, the Turbidity and Sediment Control Plan shall include temporary flow-routing measures; locations and descriptions of all temporary controls; spoil-area controls and stabilization measures; downstream control reach layout and stabilization measures; turbidity monitoring locations and monitoring frequency; background monitoring location and method of determining background turbidity; action thresholds and corrective actions; staged construction sequencing; and storm contingency and shutdown procedures.

3.4.8. All turbidity monitoring and required response actions shall be performed in accordance with 8.2 below and the approved Turbidity and Sediment Control Plan. Approval of the plan by the COR shall not relieve the Contractor of responsibility for maintaining water-quality protection throughout construction or for providing any additional temporary controls necessary to prevent uncontrolled sediment release.

3.4.9. All temporary turbidity and sediment control measures shall comply with these specifications, the approved turbidity and sediment control plan, and all applicable state and federal regulatory requirements. Upon issuance of project permits, certifications or other regulatory approvals applicable to the work, the Contractor shall comply with all conditions contained therein.

3.4.10. When storm flows are forecasted or observed that they could overtop, bypass, or compromise temporary controls, the Contractor shall place the site in a storm-safe condition. Temporary works that could trap flow, fail, or cause uncontrolled sediment release shall be removed, opened, protected, or otherwise stabilized, and flow shall be routed through the most stable practicable portions of the project

4. Dam Demolition and Breach Construction

4.1. Saw cutting and Controlled Demolition

4.1.1. Sawcut lines shall define the lateral limits of the breach on the downstream dam face. Demolition shall proceed in controlled lifts and shall not create an uncontrolled hydraulic connection. Final dam cuts shall be clean with no sharp edges. Jackhammer or other mechanical means to demolish concrete dam are acceptable within the breach width.

4.2. Dam Breach Construction

4.2.1. Construct a final 30-foot-wide breach through the dam at the location shown on the final plans. Demolition shall include removal of downstream apron concrete within the breach limits and shall extend from the top of spillway to the design channel elevation. Limits of Breach will be defined in field by COR. Initial demolition shall conform to the following standards:

4.2.1.1. The remaining portion of the dam shall be free from sharp edges.

4.2.1.2. Remaining portions of the dam may be repaired with non-shrink grout or other approved method approved by the COR.

4.3. Breach Constraints

4.3.1. Initial pilot breach opening shall be limited to 10 feet wide and excavated to the design bottom elevation shown on the plans. The breach shall then be widened in controlled stages to the final 30-foot base width, with any widening beyond 30 feet only under elected option items.

4.4. Payment

4.4.1. Payment will be incidental to C1 Base breach demolition and formation (first 30 LF).

5. Construction Sequencing

5.1. Construction Sequencing Plan

5.1.1. Submittal and sequencing work should be incidental to the related bid items and not separately measured for payment.

5.1.2. A detailed construction sequencing plan will be submitted to the COR for approval at least 15 days prior to the start of construction. This plan will include a detailed breaching plan to include the method(s) to be used for concrete removal.

5.1.3. Work in sections 5.2 - 5.4 below shall be paid under the applicable access, drawdown, downstream control reach, riprap, and grade control bid items rather than as separate sequencing items.

5.2. Access and Setup

5.2.1. Install and maintain downstream turbidity/sediment controls at designated locations prior to any drawdown or earthwork in/near the channel. Contractor to provide specifications for controls as submittal.

5.2.2. Establish and stabilize access, including any required stream crossing improvements, before mobilizing heavy demolition/removal activities.

5.2.3. Install monitoring points 8.2 below and begin baseline readings for 48–72 hours.

5.3. Phase 1: Controlled Drawdown (No Breach)

5.3.1. Begin drawdown using approved pump/siphon methods without creating open-channel connectivity through/around the dam.

5.3.2. Stabilization criteria must be maintained as per 8.2 below.

5.3.3. Drawdown discharge shall be routed to an approved stabilized discharge point and shall not cause channel erosion or uncontrolled sediment release.

5.3.4. Prohibition: No breach, notch, or excavation through the embankment is permitted in Phase 1.

5.4. Phase 2: Breach Hard Control and Hard Control Preparation

5.4.1. Prior to any breach, notch, or hydraulic connection below the retained sediment surface, the Contractor shall construct, stabilize, and maintain the downstream turbidity-control reach required by 3.4 above.

5.4.2. The downstream turbidity-control reach shall extend from the dam outlet / breach area to the approved downstream tie-in point and shall be sufficiently complete to receive temporary bypass discharge, pilot outlet flow, and any other temporary flow released during staged construction.

5.4.3. At a minimum, the downstream turbidity-control reach shall include grade control, bank tie-ins, toe protection, armoring, transitions, and any additional stabilization measures necessary to establish a controlled and stable downstream flow path consistent with 3.4 above, the plans, and approved submittals.

5.4.4. Grade Control #1 shall be placed at or near the dam toe / outlet apron zone. Additional downstream grade control shall be installed at locations and spacing sufficient to control bed slope, prevent head cut migration, and stabilize the reach. Final number, spacing, and configuration shall be as shown on the plans or approved by the COR.

5.4.5. Where the downstream turbidity-control reach interfaces with temporary access, road-mat crossings, or other temporary construction features, the Contractor shall provide any additional stabilization, armoring, or tie-in treatment necessary to prevent undermining, flanking, uncontrolled scour, or bypass of the intended flow path.

5.4.6. To the maximum extent practicable, grade controls, armoring, and associated stabilization placed as part of Phase 2 shall be designed and located so they can remain in place and be incorporated into the final downstream restoration configuration.

5.4.7. The Contractor shall show in the required submittals how the downstream turbidity-control reach, downstream vehicle crossing, temporary flow path, and final tie-in will function together during construction.

5.4.8. Prohibition: No breach, hydraulic connection, or enlargement below the retained sediment surface is permitted until the COR confirms that Phase 2 is complete and stable.

5.4.9. Measured for payment under Bid Item B3 Downstream temporary turbidity-control reach / flow controls.

5.5. Phase 3: Controlled Hydraulic Connection

5.5.1. Temporary bypass work should be paid under Bid Item B2 Upstream temporary weir and 24-inch bypass , standby pumping under Bid Item B4 Contingency pumping / bypass maintenance, base pilot breach and controlled enlargement to the 30-foot base width under Bid Item C1 Base breach demolition and formation (first 30 LF), and any widening beyond 30 feet only under elected option items. Channel construction and upstream sediment management associated with the base breach should be paid under Bid Item D1 Reservoir Channel Excavation to profile.

5.5.2. Contractor shall install a temporary weir and bypass system through the reservoir. At the Contractor's discretion, the bypass pipe may be routed either over the dam or through the dam, provided the selected configuration maintains a sufficient downslope gradient to allow free-flowing discharge.

5.5.3. If the Contractor elects to route the temporary bypass over the dam, the over-dam segment shall be installed at a fixed static elevation that generally corresponds to the field-verified retained sediment surface. In this configuration, the bypass shall discharge over the dam into the downstream turbidity-control reach required by Section 3.4 above. The bypass outlet, downstream transition, and all associated temporary stabilization and control measures shall be fully installed and functional prior to any breach below the retained sediment surface.

5.5.4. If the Contractor elects to route the temporary bypass through the dam, a section of the dam may be removed within the planned 30-foot breach area to allow passage of the bypass pipe. Any temporary stabilization, control measures, and structural support necessary for this configuration shall be installed and functional prior to breaching below the retained sediment surface.

5.5.5. Alternate bypass methods may be used with approval by the COR with engineering consultation.

5.6. Contingency Pumping

5.6.1. The Contractor shall provide standby pumping capacity sufficient to manage bypass interruption, localized overtopping, or other temporary flow-control contingencies during construction.

5.7. Phase 4: Breach

5.7.1. Pilot Outlet Construction

5.7.1.1. Following initial drawdown, the Contractor shall construct a pilot outlet through the dam in controlled stages. The pilot outlet shall be advanced in discrete increments and stabilized after each stage so that sediment migration, scour, and uncontrolled downstream transport are minimized.

5.7.2. Staged Breach Progression

5.7.2.1. Pilot outlet enlargement shall occur in discrete stages with, hold points and monitoring after each stage. Unless otherwise approved by the COR, maximum notch deepening per stage shall be 1 to 2 feet, and maximum notch widening per stage shall be 1 to 3 feet.

5.7.3. Hold Points

5.7.3.1. Work shall pause after each stage of pilot outlet construction until turbidity action level, downstream control measures, and site stability have been evaluated and COR authorizes continuation.

5.7.4. Initial Pilot Outlet Geometry

5.7.4.1. The initial pilot outlet shall be limited to an approximately 10-foot-wide notch and shall progress to the design bottom elevation shown on the plans in drawing C-10 Sheet 11, or to competent native material where directed. If a concrete key is encountered, it shall remain in place if necessary to prevent head cutting or uncontrolled undermining. Any concrete left in place shall be free of exposed sharp edges.

5.7.5. Upstream Sediment Management Prior to Breach Enlargement

5.7.5.1. After the initial pilot breach has been advanced to the design bottom elevation, the Contractor shall begin upstream sediment management and channel construction through the reservoir reach before proceeding with further breach widening, unless otherwise approved by the COR. The purpose of this sequence is to limit unnecessary exposure of unstable retained sediment and reduce the potential for uncontrolled sediment transport. Any subsequent breach enlargement shall occur only in controlled stages, after the pilot corridor and downstream turbidity control reach are stable and only to the extent necessary to achieve the final channel and breach configuration shown on the plans

5.7.6. Controlled Enlargement to Final Breach Width

5.7.6.1. After the design bottom elevation has been reached and the pilot corridor has been established, controlled widening of the breach may proceed in accordance with the approved sequencing plan until the final breach width shown on the plans is achieved. Care shall be taken throughout to minimize sediment migration and uncontrolled downstream transport.

5.7.7. Temporary Flow Conveyance

5.7.7.1. All temporary flow conveyance facilities, including the upstream control weir, temporary bypass, and associated outlet and transition features, shall be maintained in functional condition throughout construction until permanent hydraulic connection is established and approved by the COR.

5.7.8. Breach Geometry Control

5.7.8.1. Prior to commencing pilot outlet construction, the Contractor shall submit a breach sequencing and geometry plan showing the proposed notch configuration, staged widening and lowering sequence, tie-in to design grades, and all associated temporary stabilization measures.

5.7.8.2. The breach shall be advanced in controlled stages and shall not extend below the design channel elevation shown on the plans.

5.7.8.3. Breach widening, lowering, and tie in shall be performed so that the intended final breach geometry is achieved without overbreak, uncontrolled undermining, or abrupt transitions to the upstream or downstream channel.

5.7.8.4. If concrete is encountered at the design channel elevation within the breach limits, including a concrete key trench, grouting, apron remnant or other buried structural element, the contractor shall remove such material to the extent necessary to achieve the design channel grade and stable tie in show on the plans, unless otherwise directed by COR.

5.7.8.5. The contractor shall remove the cut stone, masonry other foundation material encountered downstream of the apron or directly below the dam within the breach limits, such material shall be removed where necessary to achieve design grade and stable hydraulic connection through the breach. Removed stone may be reused elsewhere in the project as approved by COR

5.7.8.6. Concrete demolition, or other structural material encountered and removed within the breach in order to achieve final breach geometry shall be considered incidental to C1 Base breach demolition and formation (first 30 LF) and shall not be measured for separate payment.

5.7.9. Final Breach Stabilization and Tie-in

5.7.9.1. The final breach shall be excavated through the dam and apron within the limits shown on the plans and carried down to bedrock or competent foundation as shown on the plans. The historical plans do not show a key trench under the dam. If the design elevation is encountered and a key trench is found, the contractor should stop excavation.

5.7.9.2. Since the breach is intended to be founded on rock, the final breach section shall rely primarily on removal to the design limits rather than a separate control feature.

5.7.9.3. The final breach shall be left free of loose concrete, protruding reinforcing steel, sharp edges, undermined margins, or unstable remnants that could create erosion, scour, safety hazards, or interference with channel function.

5.7.9.4. Breach hard control shall be integrated with the downstream turbidity control reach, tie ins and final channel profile so that the breach does not create an isolated local control, head cut or unstable hydraulic drop.

5.7.9.5. Riprap, roughened bed, tied-in grade control, and other final stabilization should be paid under Bid Items E1 through E5-Option, as appropriate, or under the elected option item where the added work is caused solely by option for breach widening.

5.7.9.6. The breach shall not extend below the design channel elevation shown on the plans. The Contractor shall maintain stable grade control through the breach location using roughened bed material, tied-in grade control, or other approved final treatment shown on the plans.

5.7.10. Downstream Transition / Stilling Reach

5.7.10.1. Measured for payment under Bid Item E2 Bedding / filter stone, together with Bid Item E1 Riprap / boulder armoring or E5-Option Imported Streambed Material where armoring and grade control are required.

5.7.10.2. Construct a stabilized transition/stilling reach downstream of the breach before establishing permanent hydraulic connection. The transition reach may consist of riprap lining, roughened bed material, rock grade controls, or other final features shown on the plans. This will dissipate energy, protect the downstream channel, and reduce erosion risk.

5.7.10.2.1. Payment shall be incidental to Bid Item B3 Downstream temporary turbidity-control reach / flow controls.

5.8. Appurtenant Dam Structure Decommissioning

5.8.1. Where encountered or exposed during demolition, designated appurtenant dam structures, abandoned utilities, and related features shall be decommissioned, removed, filled, or abandoned in place as shown on the drawings or as directed by the COR. Appurtenant structures addressed by this section include the downstream concrete box outlet structure, upstream intake well, abandoned water line, conduits, pipe penetrations, and other designated features specifically identified for removal or decommissioning. Existing headwalls, wingwalls, and other appurtenant concrete features not specifically identified for removal shall remain in place unless otherwise shown on the drawings or directed by the COR. The Contractor shall notify the COR when previously unidentified structures, utilities, pipes, conduits, voids, or other appurtenant features are exposed during demolition. Removal shall not include existing headwalls, wingwalls, or other adjacent concrete features unless specifically shown on the drawings or directed by the COR.

5.8.2. Downstream Concrete Box Outlet Structure

5.8.2.1. The downstream concrete box outlet structure shall be removed to the limits shown on the drawings or as directed by the COR. Removal shall include the designated concrete box structure, and associated debris necessary to eliminate the structure as an open void, obstruction, or future maintenance concern.

5.8.2.2. The resulting excavation shall be backfilled with non-erodible material, placed in a stable manner, and graded to drain.

5.8.2.3. Backfill shall not create ponding, concentrated flow, settlement hazards, unstable slopes, or preferential flow paths. Final grades shall blend with adjacent ground and shall be stabilized in accordance with the project erosion-control and restoration requirements.

5.8.2.4. Concrete, pipe, metal, and debris generated from removal shall be handled in accordance with the applicable demolition, concrete handling, salvage, reuse, and disposal sections of the specifications.

5.8.3. Abandoned Water Line

5.8.3.1. Where abandoned water line is exposed during demolition, excavation, grading, or channel construction, the exposed portion shall be removed unless otherwise directed by the COR. Removal shall include exposed pipe, fittings, valves, anchors, thrust blocks, supports, or associated debris as necessary to eliminate the abandoned utility as an obstruction, seepage path, or future maintenance concern. Open pipe ends remaining in place shall be plugged, capped, grouted, crushed, or otherwise sealed as approved by the COR to prevent piping, seepage, animal entry, sediment entry, or future void formation. Excavations resulting from removal of abandoned water line shall be backfilled with non-erodible material where located in or near the constructed channel, dam breach, outlet area, scour channel, or other areas subject to flow. In upland areas not subject to flow, backfill may consist of suitable excavated material if approved by the COR. Pipe, valves, fittings, metal, and unsuitable debris removed from the abandoned water line shall be removed from the site and legally disposed of unless otherwise approved.

5.8.4. Intake Well

5.8.4.1. The intake well on the upstream side of the dam shall be decommissioned by filling the structure with excavatable controlled low-strength material, also referred to as flowable fill. The intake shall be filled to surface. The purpose of filling the intake well is to eliminate the open vertical void, reduce future entry hazards, and limit future accumulation of water, sediment, debris, animals, or people to the extent practical.

5.8.4.2. Before placement of flowable fill, the Contractor shall remove trash, loose debris, and other deleterious material from the intake well to the extent practical. Standing water shall be removed where practical, but complete dewatering of the intake well is not required unless necessary for placement of flowable fill.

5.8.4.3. Existing gates, gate frames, stems, guides, trash racks, embedded metal, and associated appurtenances within the intake well may remain in place unless they interfere with filling the structure, create an unstable condition, or are specifically identified for removal on the drawings. The Contractor is not required to remove gates or embedded gate hardware from the intake well prior to placement of flowable fill.

5.8.4.4. Loose debris, trash, and readily removable material shall be removed to the extent practical. Flowable fill shall be placed to encapsulate remaining gates, embedded metal, and appurtenances and to reduce or eliminate internal voids to the extent practical.

5.8.4.5. The intake well may contain openings, pipe penetrations, conduits, or other connection points that are not accessible for capping, plugging, or sealing. The Contractor is not required to cap or physically seal inaccessible openings prior to placement of flowable fill.

5.8.4.6. The reservoir-side opening is understood to be blocked by accumulated sediment, and the downstream outlet structure is designated for removal under this contract. Based on these conditions, significant uncontrolled loss of flowable fill from the intake well is not anticipated. The Contractor shall place flowable fill in a controlled manner and observe placement for unusual or excessive loss of material. If placement indicates substantial unexpected loss of flowable fill into connected pipes, conduits, voids, or surrounding areas, or if existing gates, frames, or appurtenances prevent placement of flowable fill or result in significant unfilled voids, the Contractor shall notify the COR for direction.

5.8.4.7. Flowable fill shall be placed to fill the intake well and reduce or eliminate internal voids to the extent practical. The top of the filled intake well shall be finished flush with, or below, surrounding proposed grade as shown on the drawings or directed by the COR.

5.8.5. Flowable Fill Material

5.8.5.1. Flowable fill shall be excavatable controlled low-strength material suitable for filling abandoned structures, voids, and inaccessible spaces. Flowable fill shall be self-consolidating, non-segregating, and capable of filling the intake well without mechanical compaction.

5.8.5.2. Flowable fill shall consist of Portland cement, fly ash or other approved supplementary cementitious material, fine aggregate, water, and admixtures as necessary to produce a flowable, stable mixture. The material shall be free of trash, organic material, frozen material, petroleum contamination, and other deleterious substances.

5.8.5.3. Flowable fill must be contained as to avoid release that can have an adverse environmental impact of native wildlife, amphibian or fish species.

5.8.5.4. Flowable fill shall meet the following requirements:

5.8.5.4.1. 28-day compressive strength: 50 psi minimum and 150 psi maximum.

5.8.5.4.2. Absolute maximum 28-day compressive strength: 300 psi.

5.8.5.4.3. Consistency: Flowable enough to fill the intake well and reduce internal voids without mechanical compaction.

5.8.5.4.4. Segregation: Mixture shall remain uniform during placement and shall not segregate.

5.8.5.4.5. Shrinkage: Mixture shall be proportioned to minimize settlement and shrinkage.

5.8.5.4.6. The Contractor shall submit the proposed flowable fill mix design or supplier's standard controlled low-strength material mix to the COR for review prior to placement.

5.8.6. Material Handling and Disposal

5.8.6.1. Concrete, pipe, metal, trash, and other debris generated from appurtenant structure removal shall be handled in accordance with the applicable demolition, concrete handling, salvage, reuse, and disposal sections of the specifications.

5.8.6.2. Concrete suitable for approved on-site reuse may be incorporated into approved fill areas only where allowed by 1.18.8 above. Concrete containing rebar, wire mesh, metal, trash, asphalt, wood, organics, petroleum contamination, or other deleterious material shall not be reused unless the unsuitable material is removed and the concrete is approved by the COR.

5.8.6.3. Pipe, valves, metal fittings, trash, and unsuitable debris shall be removed from the site and legally disposed of unless otherwise approved.

5.8.6.4. Measurement and Payment

5.8.6.4.1. Appurtenant dam structure decommissioning, including outlet works demolition, and abandoned water line protrusions, and removal of others which may be incurred within the work area are incidental to Bid Item C4 Appurtenant Structure Demolition or Decommissioning . Additional non-concrete material disposal and haul fees are incorporated into Bid Items C6 Additional Material Disposal and C7 Additional Material Haul respectively. Concrete haul and disposal are incidental to C2 Concrete / masonry haul (off site and C3 Concrete / masonry disposal fee (off site, as appropriate.

5.8.6.5. Intake Structure Decommissioning is incidental to Bid Item C5 Intake Structure Decommissioning .

5.8.6.6. Flowable fill, including mix design submittal, furnishing, placement, monitoring during placement, finishing, encapsulation of existing gates and appurtenances, and associated surface restoration, shall be incidental to the appurtenant dam structure decommissioning work unless a separate bid item is provided.

5.8.6.7. No separate payment will be made for removal or correction of improperly abandoned structures, unstable backfill, unsealed accessible pipe openings, exposed voids, unsuitable material placed in the work, or work required due to the Contractor's failure to perform the work in accordance with this section.

6. Reservoir Restoration, Grade Control, and Stabilization

6.1. Stream Channel Construction

6.1.1. Construct the restored stream channel from the upstream end of the former reservoir progressing downstream toward the breach. The planning corridor width is approximately 22.5 feet and increases to 30 feet as the channel approaches the dam and breach. The final low-flow thalweg may be narrower within the corridor, as indicated on the final plans.

6.1.2. Sediment excavated during channel construction shall remain within the reservoir footprint unless otherwise directed but shall only be placed in areas shown on the plans or otherwise approved by the COR where the material can be graded to stable geometry without creating unstable channel margins, excessive confinement, or adverse hydraulic transition conditions.

6.1.3. Where shown on the plans or approved by COR, excavated sediment may be contoured into adjacent reservoir slopes, hillsides, or landforms that tie into the adjacent topography provided the placed material remains stable, drains adequately, and does not slough or erode into constructed channel.

6.1.4. Placed sediment shall not be used to create steep unsupported margins, abrupt breaks in slope, or confined channel edges that would impair channel stability, maintenance the intended corridor or downstream hydraulic performance.

6.1.5. Final grading shall provide positive drainage and tie smoothly into adjacent slopes, spoil areas, and restored channel corridor without creating ponded areas, reverse grades or unstable slopes. Graded surfaces shall be shaped so that runoff disperses in a stable manner and does not concentrate discharge in a way that causes erosion, sloughing or sediment delivery to the constructed channel.

6.1.6. Measured for payment under Bid Item D1 Reservoir Channel Excavation to profile.

6.2. Streambed Simulation / Channel Bedding Material

6.2.1. The streambed simulation approach for this project is intended to rely on a combination of bedrock-controlled profile, selective coarse bedding material, retained or placed coarse bed material, optional cross-valley log jams, optional wood deflectors, riffles where used, and associated sediment retention to create a stable and naturalized channel form through the former reservoir. The Contractor shall not assume that a uniform blanket of bedding material alone is sufficient to achieve the intended channel condition.

6.2.2. Channel bedding and streambed simulation material is intended to be obtained primarily from suitable coarse material encountered on site within approved excavation or borrow areas shown on the plans or approved by the COR. The Contractor may selectively mine, sort, stockpile, and later place suitable coarse material recovered from the reservoir footprint for use as permanent channel bedding, streambed simulation material, or localized coarse bed treatment.

6.2.3. The Contractor shall sequence excavation so that suitable coarse material is recovered, segregated, and protected before it is mixed with unsuitable sediment, buried by spoil placement, or otherwise lost to construction operations. Areas mined for suitable coarse material may subsequently be used for approved spoil placement, sediment grading, or restoration shaping, provided final grades, drainage, and slope stability are maintained in accordance with the plans and specifications.

6.2.4. Suitable streambed simulation or channel bedding material shall consist of hard, durable gravel, cobble, stone and small boulder material capable of resisting weathering and water action in the completed channel. Material may include competent native rock and coarse alluvial material approved by the COR. Material shall be free of muck, excessive organic material, trash, roots, large woody debris not intended for channel construction, excessive silt or clay, or highly weathered rock or other material that readily breaks down during handling, and other unsuitable material for channel bed construction. Material shall be similar in general character to stable coarse material found in the natural system to the maximum extent possible.

6.2.5. The Contractor shall not assume that all material encountered within the reservoir is suitable for permanent channel use. Suitable coarse material is expected to located in the upstream reach of the reservoir footprint. Coarser material may be recoverable from the upper reservoir or other approved areas, but the lower reservoir and dam-adjacent sediments may contain substantial fines, organics, muck, or mixed material unsuitable for permanent channel bedding without sorting and approval by the COR.

6.2.6. On-site material proposed for permanent channel use shall be sorted, blended, or otherwise processed as necessary to meet the intended performance requirements of the channel. Material that does not meet the intended characteristics for bedding or streambed simulation shall be managed as unsuitable or excess material in accordance with the plans and specifications.

6.2.7. The Contractor may use approved on-site material for permanent channel construction only where, in the judgment of the COR, the material is sufficiently durable, coarse, and well graded in appearance to function as intended. Acceptance may be based on visual inspection and field judgment.

6.2.8. The Contractor shall not assume that sufficient suitable material will be available on site to complete all bedding, streambed simulation, or coarse bed treatment work. If adequate suitable material is not available on site, the Contractor shall furnish imported material meeting the requirements of the plans and specifications. Imported material shall be paid under Bid Item E5-Option Imported Streambed Material.

6.3. Bedrock-Controlled Channel Excavation.

6.3.1. The restored channel through the reservoir is anticipated to be excavated to competent bedrock or a bedrock-controlled subgrade for much of the reach. Where competent bedrock is encountered at or above the proposed channel profile, the Contractor shall not excavate, hammer, blast, or otherwise remove bedrock solely to achieve a uniform excavated trench or uniform bedding depth as approved by the COR.

6.3.2. Competent bedrock encountered at or above the proposed profile shall be preserved and incorporated into the finished channel where, in the judgment of the COR, it supports the intended channel grade, roughness, stability, and stream simulation character. Bedding, riffles, coarse-bed transitions, chinking stone, and pool/ optional cross valley logjam and wood deflector features shall be field-fit around retained bedrock irregularities as needed to provide stable tie-ins and avoid abrupt drops, perched edges, or concentrated flow paths.

6.3.3. Where bedrock is encountered below the proposed profile, or where over-excavation occurs, the Contractor shall restore the channel to the required lines and grades using approved streambed simulation material, bedding stone, riprap, or other approved material as shown on the plans or directed by the COR.

6.3.4. Contractor shall not place permanent channel bedding, streambed simulation material, riprap, or large wood structures directly on unsuitable material at channel subgrade. Unsuitable materials consist of:

6.3.4.1. Muck

6.3.4.2. Organic sediment

6.3.4.3. Soft saturated fines

6.3.4.4. Buried woody debris

6.3.4.5. Unstable sediment

6.3.5. The Contractor shall notify the COR when unsuitable material is encountered at design grade. The COR may direct one or more of the following treatments:

6.3.5.1. Excavate unsuitable material to reach competent bedrock, firm native mineral soil, dense coarse sediment, or other acceptable bearing material.

6.3.5.2. Replace excavated material with approved streambed simulation material, bedding stone, filter stone, riprap, or other approved material.

6.3.5.3. Stabilize the subgrade using granular filter/bedding material, or other approved separation and stabilization treatment.

6.3.5.4. Adjust the channel section, bedform, or profile locally to incorporate competent material or stable bedrock.

6.3.5.5. Manage the area as directed by the COR where field conditions require different treatment to achieve the intended stable channel condition.

6.3.5.6. Unsuitable material removed from the channel subgrade shall be handled as reservoir sediment. Excavation and replacement shall not create abrupt grade breaks, perched channel sections, subsurface piping paths, or unstable transitions.

6.3.5.7. Over bedrock or other hard subgrade, channel bedding shall be placed to a minimum compacted thickness of 12 inches in the general channel bed unless otherwise shown on the plans or approved by COR. Material shall be shaped, seated, keyed, and chinked as needed to create stable bed surface and prevent migration for flushing.

6.3.6. Government estimates a minimum quantity of 250 CY of minable bedding material. This is incidental to Bid Item D1 Reservoir Channel Excavation to profile. Should that not be attainable it will be prorated incidental to Bid Item E5-Option Imported Streambed Material. Bedrock irregularities, undulations, depressions, and local highs may be incorporated into the finished streambed where they support the intended stream simulation, improve bed roughness, assist with seating coarse material, or enhance localized bed form expression. Such natural irregularities shall not be unnecessarily over-excavated or smoothed where they can be incorporated into a stable final channel.

6.3.7. Streambed simulation material, channel bedding, roughened bed material, and channel rock shall be placed in a controlled manner to achieve the lines, grades, thicknesses, and bedforms shown on the plans. Material shall be worked, shaped, blended, and seated to form a stable and well-graded bed surface.

6.3.8. Larger particles shall be distributed throughout the work and not concentrated in isolated pockets unless shown on the plans or approved by the COR. Voids that would impair stability or create undesirable flow concentration shall be chinked or filled with smaller suitable material where needed to achieve the intended bed form and stability.

6.3.9. Unless otherwise approved by the COR, placement of streambed simulation and coarse bed materials shall proceed from downstream to upstream, so that completed work is not unnecessarily disturbed by subsequent operations.

6.3.10. Streambed simulation and channel bedding material shall be measured for payment under the applicable bedding, streambed simulation, or channel construction bid item.

6.3.11. Treatment of unsuitable material at design subgrade shall be paid under the applicable excavation, bedding, streambed simulation, filter stone, riprap, geotextile, as provided in the Schedule of Items. Where no separate bid item is provided, minor unsuitable material treatment necessary to complete the work shall be considered incidental to the related channel construction item, unless otherwise directed by the COR.

6.4. Bedform Development and Channel Feature Construction

6.4.1. The restored channel through the upstream portion of the former reservoir shall be constructed to an approximate 22.5-30 foot bankfull width as shown on the plans or adjusted in the field with approval from the COR. The 22.5-30 foot width is intended to represent the primary restored channel geometry through the upstream reservoir restoration reach and shall be field fit to the actual bedrock surface, remaining sediment, and stable tie-in conditions encountered during excavation.

6.4.2. The restored channel shall transition from the approximate 22.5-foot bankfull width to a width of 30-feet at the breach approach and breach transition, as shown on the plans. The widening is intended to match the base breach width, provide stable tie-ins to the retained dam/abutment features, accommodate riprap or roughened grade-control treatments, reduce concentrated scour at the breach interface, and provide a stable transition through areas of larger banks, disturbed soils, or poorer foundation conditions.

6.4.3. The transition from 22.5 feet to 30 feet shall be gradual over the limits shown on the plans, unless otherwise approved by the COR. The transition shall not be constructed as an abrupt expansion, perched channel edge, artificial windrow, or isolated excavated notch. Finished grades and side slopes shall be blended into the adjacent reservoir restoration grades and stabilized as shown on the plans.

6.4.4. Optional cross-valley log jams, transverse wood structures, or other channel-spanning wood features shall not be installed within the breach approach transition unless specifically approved by the COR. The breach approach transition shall remain free of transverse wood features that could trap floating trees or debris, create an unintended impoundment, obstruct flood conveyance through the breach, or interfere with the intended breach hydraulics. Wood features outside this zone shall be located and oriented as shown on the plans.

6.4.5. Bedding and streambed simulation material within the breach approach transition shall be treated as a roughened coarse-bed transition rather than a uniform thin blanket of material. Where material is placed over bedrock or hard subgrade, it shall be thickened, seated, keyed, chinked, and blended as needed to prevent flushing, sliding, or concentration of flow over smooth bedrock surfaces. The treatment may include approved streambed simulation material, cobble, small boulders, chinking stone, localized riprap, or other approved coarse material shown on the plans or directed by the COR.

6.4.6. Coarse-bed material in the breach approach transition shall be keyed into available bedrock irregularities, depressions, steps, bank margins, riprap transitions, or other stable features where practicable. Where smooth or planar bedrock is encountered, the Contractor shall not simply place a thin, loose veneer of bedding material. The Contractor shall field-fit the treatment using roughened transitions, thickened bedding, larger stone, chinking, or other approved measures to create a stable interlocked bed surface.

6.4.7. The breach approach transition shall tie into the breach riprap, boulder armoring, roughened grade-control section, or downstream transition treatment shown on the plans. The upstream end of the transition shall blend into the 22.5-foot restored reservoir channel without abrupt grade breaks, flanking paths, perched margins, or concentrated flow against unstable sediment or reservoir spoil margins.

6.4.8. The breach approach transition shall be field fit to actual conditions encountered during excavation, including bedrock highs, bedrock steps, depressions, seepage, unsuitable material, or variable reservoir sediment. Competent bedrock that supports the intended channel profile and roughness shall be preserved and incorporated where practicable. Soft, organic, or unsuitable subgrade material shall not be used as the final bearing surface for permanent bedding, riprap, or channel features without COR approval.

6.4.9. Construction of the breach approach transition shall be measured for payment under the applicable channel excavation, streambed simulation/channel bedding, riprap/boulder armoring, roughened transition, options, or channel construction bid items as provided in the Schedule of Items. Supplemental imported streambed simulation material shall be used only when approved by the COR when suitable onsite coarse material is unavailable or insufficient.

6.4.10. The restored channel through the former reservoir shall be constructed to achieve a stable streambed and channel form consistent with the plans, the design profile, and the intended stream simulation character of the project. Channel features may include localized riffles, roughened coarse-bed transitions, pool features, optional cross-valley log jams, optional wood deflectors, localized roughness elements, bedrock features, and other grade or alignment controls shown on the plans or approved by the COR.

6.4.11. Channel features are intended to work together with the constructed bed, retained or placed coarse material, bedrock-controlled profile, and installed wood or rock elements to provide bed stability, sediment retention, flow diversity, channel roughness, and naturalized bedform development through the former reservoir reach.

6.4.12. The Contractor shall not assume that all bedform expression will be created by excavation alone. In areas of shallow bedrock, limited available cut, constrained tie-in elevations, or smooth bedrock surfaces, pool definition, roughness, grade continuity, and local variability may be achieved through a combination of coarse bed material, optional cross-valley log jams, optional wood deflectors, riffle features, roughened transitions, grade control, localized shaping, chinking, boulder placement, and retained natural bedrock irregularities.

6.4.13. Where the constructed channel is excavated to bedrock, the Contractor shall preserve stable bedrock irregularities, depressions, steps, ledges, roughness elements, and localized natural grade breaks where they support the intended channel form and function. The objective is to create a stable and naturalized bed surface, not a uniformly graded trench. Bedrock shall not be unnecessarily over-excavated, smoothed, or removed where it can be incorporated into the final channel.

6.4.14. Smooth or planar bedrock areas that are likely to allow bedding material to flush downstream shall receive localized coarse-bed transitions, riffles, keying, chinking, thickened bedding, boulder/rock roughness elements, or other approved treatment as shown on the plans or directed by the COR.

6.4.15. Optional cross-valley log jams, wood deflectors, and similar wood structures are intended to contribute to pool formation, sediment retention, roughness, and local bed stability, but shall not be relied upon as the sole means of creating stable pool-riffle structure or retaining streambed simulation material throughout the reservoir reach. Associated pools, riffles, outlet controls, coarse-bed transitions, bedding limits, and tie-ins shall be constructed as shown on the plans or as adjusted with COR approval.

6.4.16. Pool features associated with optional cross-valley log jams, wood deflectors, or other structures shall be excavated, shaped, or field-fit as needed to establish the intended bedform. Pool construction may include localized excavation into sediment or weathered material, use of natural bedrock depressions, placement of coarse outlet-control material, chinking of larger material, and seating of large wood or boulder elements. Pools shall not be formed in a manner that undermines structure embedment, destabilizes banks, creates uncontrolled scour, or causes flow to flank around the installed feature.

6.4.17. Localized coarse-bed riffles and roughened transitions shall be constructed where shown on the plans or adjusted with COR approval to provide bed roughness, retain streambed simulation material, support pool formation, transition between grade controls, and prevent flushing of bedding material over bedrock.

6.4.18. Riffles and roughened transitions shall be field-fit to the final bedrock surface, constructed channel profile, adjacent log structures, breach transition, and upstream/downstream tie-ins. They shall be constructed of approved streambed simulation material, cobble, small boulder, chinking stone, and/or riprap where shown on the plans. Material shall be placed, seated, blended, and chinked to form a dense, stable, roughened bed surface.

6.4.19. Riffles and roughened transitions are intended to retain streambed simulation material, provide grade continuity, reduce abrupt transitions, improve bed roughness, and support pool development associated with large wood structures. Riffles shall be field fit to the final bedrock surface, channel profile, structure locations, and tie-in conditions. Riffles shall not create perched controls, abrupt drops, excessive local water-surface rise, or grade breaks inconsistent with the approved design profile.

6.4.20. Riffles shall not be constructed as loose dumped piles, artificial windrows, or abrupt transverse dams. The finished feature shall provide a gradual transition in bed elevation and roughness, shall not create uncontrolled scour or flanking, and shall not raise the channel profile above the approved tie-in elevations unless specifically shown on the plans or adjusted with COR approval.

6.4.21. Riffles or roughened transitions should be considered at the upstream reservoir/channel tie-in, immediately upstream of optional cross-valley log jams if installed and where needed to retain bedding material, at the downstream outlet of pool/log-jam complexes, at smooth bedrock reaches where bedding retention is uncertain, and at the breach/downstream transition where additional roughness or grade control is required.

6.4.22. Optional cross-valley log jams, optional wood deflectors, riffles, roughened transitions, and other channel features shall be placed so that they do not create uncontrolled scour, flanking, abrupt grade breaks, or unintended redirection of flow into unstable banks, spoil margins, remaining dam elements, access roads, or other vulnerable areas. Where riffles or roughened transitions are associated with optional cross-valley log jams, optional wood deflectors, or pool features, the Contractor shall shape the streambed, so the feature works with the optional large wood structures to retain bedding material, support localized pool development, and provide stable upstream and downstream transitions.

6.4.23. If field conditions indicate additional localized riffles, roughened transitions, coarse bed features, boulder roughness elements, or similar bedform treatments are needed to achieve channel stability or sediment retention consistent with the design intent, such features may be incorporated where approved by the COR, provided they do not raise the profile above intended tie-in elevations or conflict with the approved breach geometry. Payment for such work shall be under the applicable existing bid items identified in 6.4.24 below, unless government directs work outside those limits.

6.4.24. Bedform development and channel feature construction shall be measured for payment under the applicable bid items for D1 Reservoir Channel Excavation to profile, E1 Riprap / boulder armoring, E1-A Option Riprap / boulder armoring, E2 Bedding / filter stone, E3-Option Cross-valley log jams, E4-Option Wood Deflector, E5-Option Imported Streambed Material, grade control, F3 Final grading and site stabilization, or elected option items, as applicable.

6.5. Channel Features and Bedform Controls

6.5.1. Install channel features and bedform control as shown on plans as required to maintain channel stability, prevent upstream head cutting, retain streambed simulation material, support pool/riffle development, and tie the restored channel to the breach and downstream transition reach.

6.5.2. Channel features include optional cross valley log jams, optional wood deflectors, localized coarse bed transitions, riffles, roughened sections, boulder or riprap transitions, and other localized bedform or stability features approved by COR.

6.5.3. Five optional cross valley log jams may be constructed, if elected, where shown on the plans and may be adjusted to field fit if conditions allow and approved by COR. Cross-valley log jams shall generally follow the “Cross Channel/Valley Log Jam” typical detail shown on Sheet C-14. The optional cross-valley log jams are intended to provide major roughness, sediment retention, pool development, and localized grade/bedform control across the restored channel. Locations shall be shown on the plans and coordinated with the longitudinal profile, pool locations, bedding limits, and upstream/downstream riffle or roughened transition features. Cross valley log jams shall be configured and installed so that they function as integrated channel features, rather than full width barriers. Each structure shall maintain a continuous and stable low-flow passage through the restored channel and not create perched outlets, abrupt vertical drops, or other conditions inconsistent with the intended aquatic organism passage and channel function.

6.5.4. If installed, optional woody deflector structures shall be keyed, embedded, ballasted, racked, or otherwise secured as shown on the plans or adjusted with approval by the COR. Final location, angle, embedment, and configuration shall be field fit to the constructed channel, exposed bedrock, available wood material, bank conditions, and adjacent streambed simulation material. Structures shall not direct flow into unstable banks, spoil margins, retained dam elements, or other vulnerable areas.

6.5.5. If installed wood deflector structures will follow the applicable deflector or root wad large wood details, as appropriate for the intended field condition. Wood deflectors are intended to provide localized flow deflection, bank line roughness, pool initiation, low-flow alignment, sediment retention and integration with adjacent bedding and streambed simulation material. Wood deflectors shall not be used as full width channel blockages or primary grade-control structures except where specifically shown on the plans.

6.5.6. Optional cross-valley log jams and woody deflector structures shall not be placed within the breach approach transition or within the final 135 feet upstream of the breach unless specifically approved by the COR. The breach approach shall remain free of transverse or flow-obstructing wood features that could trap debris, create unintended impoundment, or obstruct flow through the breach.

6.5.7. Structure locations, types, approximate orientation, associated pool/riffle features, and pay item tie-ins shall be shown on the plans. Final adjustments may be made in the field by the COR to account for exposed bedrock, actual channel grade, available wood material, and site conditions.

6.5.8. Measurement and payment shall be made under the applicable bid item for E1 Riprap / boulder armoring, E3-Option Cross-valley log jams, E4-Option Wood Deflector, F3 Final grading and site stabilization.

6.6. Riprap Stabilization

6.6.1. Refer to Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects FP-14 for riprap specification details.

6.6.2. Install riprap where necessary to stabilize breach tie-ins, the downstream transition reach, localized banks, toe protection, and other areas shown on the plans or directed by the COR. Riprap shall be limited to the minimum extent necessary to provide stable grade control, prevent undermining, and protect constructed channel features.

6.6.3. R-3 riprap shall be used within the upstream reservoir restoration reach for localized bank stabilization, toe protection, tie-ins, and other areas requiring moderate armoring. R-4 riprap shall be used in the breach transition and immediately downstream of the breach where greater hydraulic forces, turbulence, or scour potential are expected.

6.6.4. Riprap shall be keyed into the bank and bed to prevent undermining, flanking, or displacement. Embedment depth shall be a minimum of 1 foot. Riprap tie-ins at the upstream and downstream limits shall be constructed so that flow cannot bypass or erode around the armored section.

6.6.5. Riprap shall be placed in a controlled manner to produce a stable, well-graded, and tightly interlocked mass. Dumping rock indiscriminately and leaving it in loose piles will not be permitted. Riprap shall be placed by equipment and arranged to achieve the lines, grades, thicknesses, and keying shown on the plans. Larger pieces shall be distributed throughout the work and not segregated in one location.

6.6.6. Where practicable, riprap shall be recessed below adjacent finished grade and partially buried, chinked, or topped with finer native material, bedding, or soil so that the completed treatment blends with surrounding channel and bank features. Riprap shall not be fully buried in a manner that compromises interlock, drainage, or hydraulic stability.

6.6.7. In the upstream reservoir restoration reach, riprap should be concealed to the maximum extent practicable while maintaining its intended stabilization function. In the breach transition and immediately downstream of the breach, greater exposure of stone may be necessary to provide the required stability.

6.6.8. The finished riprap treatment shall avoid the appearance of dumped rock slopes to the maximum extent practicable. Stone shall be worked into the bank and bed, blended with adjacent grades, and dressed with native material where feasible to create a more natural and less obtrusive appearance.

6.6.9. Riprap shall not be placed beyond the limits necessary for stabilization and shall not create abrupt edges, perched margins, or artificial windrows that conflict with the intended restored channel geometry.

6.6.10. Where riprap is placed over fine-grained reservoir sediment, reconstructed embankment, erodible native soils, or other areas susceptible to piping, undermining, or loss of subgrade material, a non-woven geotextile filter fabric or approved granular filter/bedding layer shall be installed beneath the riprap as shown on the plans or as directed by the COR. The intent is to provide separation, filtration, and subgrade protection while maintaining drainage beneath the riprap layer.

6.6.11. Geotextile shall be keyed, overlapped, and protected during placement to prevent tearing, displacement, exposure, or undermining. Geotextile shall not be left exposed in the finished work and shall be fully covered by riprap, bedding stone, chinking stone, soil, or other approved material. Where geotextile is used near channel bed features, seeps, groundwater discharge, or irregular bedrock, the Contractor shall place bedding/filter stone as needed to prevent fabric bridging, puncture, or hydraulic uplift.

6.6.12. Geotextile, bedding, filter stone, chinking stone, or other underlayment shall be placed as shown on the plans or as adjusted and approved by the COR. Any such material shall be incidental to the related riprap pay item unless separately identified in the Schedule of Items.

6.6.13. Riprap stabilization shall be measured for payment under Bid Item E1 or E1-A Option Riprap / boulder armoring and geotextile fabric shall be incidental to Bid Item F2 or F2-A Option Geotextile fabric installation as applicable.

6.7. Riprap Gradation

6.7.1. R-3- General stabilization stone for the upstream reservoir restoration reach, including localized bank protection, toe protection, tie-ins, and other areas where moderate armoring is required. Intended to provide stability under ordinary channel and moderate storm conditions while remaining as integrated with the restored corridor as practicable.

6.7.2. R-4 - Larger stabilization stone for the breach transition, breach hard control, and immediately downstream of the breach where higher velocities, turbulence, and scour potential are expected. It is intended for areas requiring more robust armoring and structural stability.

6.8. Large Wood Structures

6.8.1. If elected, large wood structures will be measured for payment under Bid Item E3-Option Cross-valley log jams or E4-Option Wood Deflector for large wood or downstream habitat features, as shown on the plans.

6.8.2. See Figure 2: Optional Large Wood Structures below for table of structures.

6.8.3. Large wood structures may be installed to increase channel roughness, provide habitat complexity, and assist in bank protection or alignment control. Logs shall be keyed, embedded, or anchored as required by the final plans.

6.9. Sediment Corridor Width Control

6.9.1. Channel excavation within the reservoir shall remain within the intended restoration corridor. And maintain a 22.5 - 30 foot-wide restoration corridor as shown on plans. Side slopes shall be stable and may vary depending on the in situ material throughout the channel excavation.

6.10. Spoil Areas / Sediment Rehandling and Placement

6.10.1. Excavated reservoir sediment, channel excavation material, unsuitable channel material, and excess mineral material shall be handled, placed, graded, or disposed of only within approved spoil placement areas, reservoir margin grading areas, laydown areas, or other locations if approved by the COR.

6.10.2. The Contractor shall separate suitable coarse material needed for streambed simulation, channel bedding, riffles, roughened transitions, bedding/chinking, or other permanent channel uses before placing remaining excavation material in spoil or sediment rehandling areas. Suitable coarse material shall not be buried, mixed with unsuitable sediment, or wasted unless approved by the COR.

6.10.3. Sediment and spoil placement within the former reservoir shall generally be limited to reservoir margin grading, floodplain bench shaping, side-slope flattening, low areas outside the constructed channel, and other locations shown on the plans. Material shall not be placed in a manner that narrows the constructed channel, blocks drainage, creates perched deposits, redirects flow into unstable banks, or interferes with the intended channel profile or breach transition.

6.10.4. Spoil and sediment placement areas shall be graded to stable slopes and blended into adjacent existing ground. Unless otherwise shown on the plans, finished slopes shall be no steeper than 3H:1V where practicable. Steeper slopes may be approved by the COR where constrained by existing topography, bedrock, retained dam features, access limitations, or other site conditions, provided the finished surface is stable and can be adequately stabilized.

6.10.5. Muck, organic sediment, saturated fines, or other wet material may require temporary draining, mixing, staged placement, thin lifts, or other handling methods before final grading. The Contractor shall manage wet material so that it does not slump into the constructed channel, discharge sediment-laden water, create unstable margins, or delay stabilization.

6.10.6. Spoil placement shall maintain positive drainage toward approved flow paths and shall not impound water against reservoir margins, retained dam elements, access roads, or completed channel features unless specifically shown on the plans. Surface drainage shall be directed away from unstable spoil margins and toward stabilized areas.

6.10.7. Material placed within reservoir margins or floodplain bench areas shall be offset from the constructed channel as shown on the plans or as directed by the COR. Spoil placement shall not encroach into the channel, the breach approach transition, riprap/boulder armoring areas, riffles, pools, large wood structures, or other constructed channel features unless specifically approved by the COR.

6.10.8. Where spoil placement is used to create reservoir margin grading or floodplain benches, the finished surface shall be shaped to avoid abrupt vertical edges, artificial berms, or continuous levee-like features. Grading shall provide a naturalized transition from the constructed channel to the adjacent reservoir surface.

6.10.9. Unsuitable material shall not be used for permanent channel bedding, riffles, roughened transitions, riprap bedding, large wood embedment support, or other structural channel features unless specifically approved by the COR. Unsuitable material may be placed in approved spoil or reservoir margin grading areas where it can be stabilized and will not affect channel stability.

6.10.10. Spoil and sediment placement areas shall be stabilized progressively as work is completed. Temporary stabilization, tracking, mulch, seed, erosion control fabric, coir fabric, or other measures shall be installed as required by the plans, permits, or as approved by the COR.

6.10.11. Measurement and payment for spoil placement, sediment rehandling, reservoir margin grading, and placement of excavated channel material shall be made under Bid Item D1 Reservoir Channel Excavation to profile Work shall include loading, hauling within the project limits, spreading, shaping, grading, moisture management, tracking/compaction as needed, and preparation for stabilization.

7. Final Grading and Stabilization

7.1. General

7.1.1. Final grading shall be performed after completion of channel excavation, breach construction, spoil placement, large wood installation, riprap placement, bypass removal, access removal, and other major earthwork activities unless otherwise approved by the COR.

7.1.2. Final grading shall restore disturbed areas to stable, drainable, and naturalized surfaces consistent with the plans, the intended restoration condition, and site constraints. Final grading shall include blending disturbed ground into adjacent undisturbed areas, removing abrupt edges, smoothing equipment ruts, eliminating unstable piles or windrows, and shaping disturbed areas to reduce erosion.

7.1.3. Final grading shall be inspected by the COR before final stabilization where practicable. Areas requiring additional shaping, drainage correction, removal of unsuitable piles, or stabilization preparation shall be corrected before final acceptance.

7.1.4. Measurement and payment for final grading and site stabilization shall be made under Bid Items F2 F2-A Option Geotextile fabric installation or F3 Final grading and site stabilization as applicable. Work shall include shaping, blending, decompaction or scarification, drainage correction, cleanup of disturbed areas, preparation for seeding/mulching, and final dressing of completed work areas.

7.2. Final Grading around Channel Features and Transitions

7.2.1. Final grading shall maintain the constructed channel geometry, breach transition, reservoir margin grading, floodplain bench limits, access removals, laydown area restoration, and downstream transition features shown on the plans. The Contractor shall not use final grading to alter the approved channel width, profile, breach invert, riprap limits, optional large wood structure function, or stabilized drainage pattern unless approved by the COR.

7.2.2. Finished surfaces shall be graded to provide positive drainage and prevent ponding, uncontrolled concentration of flow, gullying, slumping, or sediment delivery to the constructed channel.

7.2.3. Final grading around optional large wood structures, riffles, roughened transitions, riprap, and channel bedding shall be performed so that these features remain keyed, seated, and hydraulically connected to the constructed channel. Final grading shall not bury, undermine, expose, or disconnect installed channel features.

7.2.4. Final grading around the breach and downstream transition shall maintain stable tie-ins to retained abutments, wingwalls, riprap/boulder armoring, downstream bed, and channel banks. The finished surface shall not create flanking paths around the breach, perched margins, concentrated flow paths, or unstable transitions.

7.2.5. Final grading of former access roads, laydown areas, staging areas, and temporary crossings shall include removal of temporary surfacing or mats unless approved to remain, re-establishment of drainage, blending to adjacent grade, and stabilization with seed, mulch, erosion control fabric, or other measures shown on the plans.

7.3. Temporary Structure Removal

7.3.1. The Contractor shall remove temporary construction features not intended to remain, including temporary berms, temporary diversion features, temporary crossings, construction ramps, windrows, temporary stockpiles, excess spoil, and other temporary work elements unless otherwise shown on the plans or approved by the COR.

7.3.2. Disturbed areas shall be de-compacted, scarified, tracked, or otherwise prepared for stabilization where needed to promote seed establishment, reduce erosion, and blend with adjacent ground. Overly smooth, sealed, or compacted surfaces that may promote runoff concentration shall be roughened prior to seeding or mulching.

8. Erosion, Sediment, and Water Quality Controls

8.1. Erosion and Sediment Controls

8.1.1. Measured for payment under Bid Item A4 Erosion & sediment controls, installation and maintenance, except for the defined downstream turbidity-control reach, which should be paid under Bid Item B3 Downstream temporary turbidity-control reach / flow controls .

8.1.2. The Contractor will submit an Erosion & Sediment Control Plan for COR approval at least 15 days prior to the start of construction.

8.1.3. The Contractor shall install and maintain erosion and sediment control measures prior to earth disturbance. Controls may include silt fence, wattles, stabilized construction entrances, perimeter controls at laydown and road areas, temporary check structures, sediment traps, spoil-area stabilization, and other measures necessary to limit erosion and downstream sediment transport. All measures shall be maintained in functional condition throughout construction and until final stabilization is achieved.

8.2. Turbidity Monitoring

8.2.1. Measured for payment under Bid Item B3 Downstream temporary turbidity-control reach / flow controls.

8.2.2. The contractor shall monitor turbidity during reservoir drawdown, dam demolition, hydraulic connection, and channel construction and spoil placement and other work that may result in downstream sediment transport. Monitoring shall be performed in accordance with the approved Turbidity and Sediment Control Plan required by 3.4 above. The Contractor shall suspend work that causes excessive turbidity until corrective measures are implemented.

8.2.3. Background natural environmental turbidity shall be measured upstream of construction influence at a location approved by the COR. Downstream monitoring locations, monitoring frequency, and corrective actions shall be identified in the approved Turbidity and Sediment Control Plan. At a minimum, turbidity shall be monitored at the start of each workday, during active instream or sediment disturbing work, following changes in flow routing or breach condition, and after storm events. The contractor shall immediately suspend work, regardless of measured turbidity, if visible sediment releases, overtopping of controls, failure of temporary measures, or other site conditions indicate that downstream water quality is being adversely affected.

FIGURE 1 - TURBIDITY LIMITS

Condition	Required action
<25 NTU above background	Continue work; maintain controls.
25–50 NTU above background	Implement additional controls; adjust operations.
>50 NTU above background	Stop work causing turbidity until corrected and returned to acceptable range.

8.3. Construction Hold Points

8.3.1. The following Hold points shall apply unless otherwise approved in writing by the COR. These items are incidental to the related construction bid items, no separate payment.

8.3.2. Completion and approval of the initial reservoir drawdown stage prior to proceeding to further drawdown or hydraulic connection.

8.3.3. Verification and approval of the downstream turbidity-control reach, including temporary stabilization and flow-transition measures, prior to initiating breach below the retained sediment surface. The downstream turbidity-control reach shall be not less than 75 feet in length unless otherwise approved by the COR.

8.3.4. Verification of breach invert elevation, breach geometry, and temporary stabilization measures prior to permanent hydraulic connection.

8.3.5. Approval of sediment grading, spoil placement, and temporary stabilization prior to final stabilization and revegetation.

9. Vegetation Establishment and Slope Stabilization

9.1. General

9.1.1. All disturbed areas resulting from dam removal, reservoir sediment grading, channel construction, and access improvements shall be stabilized through establishment of permanent vegetation and installation of temporary erosion control measures.

9.1.2. Disturbed areas include reservoir sediment grading areas, channel side slopes and floodplain margins, dam removal excavation limits, spoil placement areas within the former reservoir, temporary access roads, staging areas, and any other areas disturbed during construction.

9.1.3. Reservoir revegetation should be measured under Bid Item F1 Seed, mulch, binder, touch-up (reservoir / disturbed areas). Geotextile fabric should be measured under Bid Items F2 or F2-A Option Geotextile fabric installation as applicable.

9.2. Site Preparation

9.2.1. Prior to seeding or installation of erosion control materials, disturbed areas shall be graded to stable slopes and free of debris, large rocks, and construction materials that would prevent adequate soil contact. Areas receiving seed shall be scarified to create a suitable seedbed and promote vegetation establishment.

9.3. Seeding

9.3.1. The Contractor shall furnish and install native seed, cover crop, soil amendments where approved, mulch, erosion-control materials, and related revegetation measures necessary to stabilize disturbed areas and establish permanent vegetative cover. Seeding shall be performed in areas disturbed by construction, including but not limited to access routes, staging areas, laydown areas, borrow or disposal areas, dam removal limits, restored channel margins, floodplain (former reservoir) areas, backfilled areas, upland disturbed areas, and other areas shown on the drawings or directed by the COR. Seed mixes shall be selected based on final site conditions and shall be appropriate for the moisture regime, slope position, restoration objective, and anticipated post-construction hydrology. Seeding shall occur immediately following final grading or installation of erosion control materials where feasible. Seed shall be broadcast or hydraulically applied and lightly incorporated into the soil surface where possible.

9.4. Seed Mix Types

9.4.1. Two seed mix types shall be used:

9.4.1.1. Wetland Meadow Seed Mix — for wet, low-lying, frequently saturated, seasonally inundated, riparian, floodplain, channel-margin, seep, and wet meadow areas.

9.4.1.2. Mesic to Dry Native Pollinator Seed Mix — for upland, drier, better-drained, access-road restoration, staging, laydown, slope, and other non-wetland disturbed areas.

9.4.1.3. The Contractor shall apply the appropriate seed mix type based on the locations shown on the drawings or as directed by the COR. Where field conditions differ from the drawings, the COR may adjust seed mix limits in the field.

9.4.2. General Conditions for both mixes include:

9.4.2.1. Be suitable for wet meadow, riparian, or facultative wetland conditions.

9.4.2.2. Include native or regionally appropriate grasses, sedges, rushes, and flowering forbs.

9.4.2.3. Include species beneficial to pollinators where practical.

9.4.2.4. Species listed as federal or state noxious weeds are prohibited.

9.4.2.5. Non-native permanent grasses are prohibited.

9.4.2.6. Be appropriate for the project region and site conditions.

9.4.2.7. Be supplied as pure live seed, or with seed tag information sufficient to determine pure live seed content.

9.4.2.8. Be approved by the COR prior to installation.

9.4.2.9. A commercially available mix may be submitted for approval as meeting this requirement.

9.5. Wetland Meadow Seed Mix

9.5.1. The Wetland Meadow Seed Mix shall consist of a diverse native or naturalized herbaceous mix suitable for wet meadow, riparian, facultative wetland, and seasonally saturated restoration areas.

9.5.2. The mix shall be appropriate for pollinator habitat, erosion control, and revegetation of wet or intermittently wet disturbed soils.

9.5.3. The mix shall include a combination of native grasses, sedges, rushes, and herbaceous flowering species adapted to wet meadow and riparian conditions. The mix shall be generally comparable in function, habitat suitability, and species diversity to a commercially available FACW wetland meadow or wet meadow restoration mix.

9.5.4. The Wetland Meadow Seed Mix shall meet the following general requirements unless otherwise approved by the COR:

9.5.5. Mesic to Dry Native Pollinator Seed Mix

9.5.6. The Mesic to Dry Native Pollinator Seed Mix shall consist of a diverse native or regionally appropriate herbaceous mix suitable for upland, mesic, dry-mesic, and better-drained disturbed areas.

9.5.7. The mix shall be appropriate for pollinator habitat, erosion control, and revegetation of upland disturbed soils.

9.5.8. The mix shall include a combination of native warm-season grasses, cool-season native grasses where appropriate, and herbaceous flowering species adapted to mesic to dry upland conditions. The mix shall be generally comparable in function, habitat suitability, and species diversity to a commercially available mesic-to-dry native pollinator or upland meadow restoration mix.

9.6. Seed Mix Submittals

9.6.1. At least 15 days prior to seeding, the Contractor shall submit proposed seed mixes to the COR for review and approval.

9.6.2. The submittal shall include:

9.6.2.1. Proposed seed mix name and supplier.

9.6.2.2. Intended use area: wetland meadow or mesic-to-dry upland/pollinator.

9.6.2.3. Full species list, including common name and scientific name.

9.6.2.4. Percent composition by weight or seeds per square foot.

9.6.2.5. Pure live seed information, including purity, germination, hard seed, and inert matter.

9.6.2.6. Proposed seeding rate.

9.6.2.7. Proposed cover crop species and seeding rate.

9.6.2.8. Seed tags or supplier certification.

9.6.2.9. Confirmation that the mix does not include federal or state noxious weeds.

9.6.2.10. Proposed seeding method and timing.

9.6.3. The COR may reject seed mixes that are not appropriate for the site, contain unsuitable species, contain excessive temporary cover crop, lack adequate species diversity, or do not meet the intent of the specified seed mix type.

9.7. Seed Quality

9.7.1. Seed shall be fresh, clean, dry, viable, and free of mold, excessive inert matter, prohibited noxious weed seed, and other deleterious material.

9.7.2. Seed shall be furnished in sealed containers labeled in accordance with applicable seed laws. Seed labels shall identify species, lot number, origin where available, purity, germination, hard seed, inert matter, weed seed content, and test date.

9.7.3. Seed shall be stored in a clean, dry location and protected from moisture, heat, contamination, rodents, and damage.

9.8. Seeding Rates

9.8.1. Permanent native seed mixes shall be applied at the supplier's recommended rate for the approved mix unless otherwise shown on the drawings or directed by the COR.

9.8.2. Unless otherwise approved, the minimum permanent seed application rate shall be:

9.8.3. Wetland Meadow Seed Mix: approximately 20 pounds per acre, or supplier-recommended equivalent rate.

9.8.4. Mesic to Dry Native Pollinator Seed Mix: approximately 20 pounds per acre, or supplier-recommended equivalent rate.

9.8.5. Seeding rates shall be based on pure live seed unless the supplier's standard mix rate is otherwise approved by the COR.

9.8.6. Where small areas are seeded by hand, the Contractor shall apply seed uniformly at a rate equivalent to the approved per-acre rate.

9.9. Cover Crop

9.9.1. A temporary cover crop shall be included with permanent seeding unless otherwise directed by the COR.

9.9.2. Cover crop shall be selected based on planting season, moisture conditions, and supplier recommendations for the approved seed mix.

9.9.3. Acceptable cover crop species may include grain rye, grain oats, Japanese millet, barnyard grass, annual ryegrass, or other approved temporary cover crop species appropriate for the seeding date and site conditions.

9.9.4. Cover crop shall be non-persistent, non-invasive, and compatible with establishment of the permanent native seed mix. Cover crop shall not be applied at rates that suppress native seed establishment.

9.9.5. Suggested cover crop rates unless otherwise approved by the COR:

9.9.5.1. Grain rye: 30 pounds per acre.

9.9.5.2. Grain oats: 30 pounds per acre.

9.9.5.3. Japanese millet: 10 pounds per acre.

9.9.5.4. Barnyard grass: 10 pounds per acre.

9.9.5.5. Cover crop species and rates shall be included in the seed mix submittal and approved by the COR prior to seeding.

9.10. Seeding Timing

9.10.1. Seeding shall occur as soon as practical after final grading, soil preparation, and stabilization of disturbed areas.

9.10.2. Seeding shall not be performed on frozen ground, snow-covered ground, saturated ground where equipment would cause rutting, or during high winds or heavy rainfall.

9.10.3. Preferred seeding periods are:

9.10.3.1. Spring seeding: after soils are workable and before extended summer heat or drought conditions.

9.10.3.2. Late summer/fall seeding: when adequate soil moisture is available and sufficient growing season remains for temporary stabilization.

9.10.3.3. Dormant seeding: after soil temperatures are consistently low enough to prevent germination until spring, where approved by the COR.

9.10.3.4. Seeding outside preferred periods may be allowed with COR approval, provided temporary stabilization, mulch, erosion-control matting, or other protective measures are used as necessary.

9.10.4. Soil Preparation

9.10.4.1. Before seeding, areas to be seeded shall be graded to the lines and elevations shown on the drawings or directed by the COR.

9.10.5. Seedbed preparation shall include:

9.10.5.1. Removing trash, construction debris, unsuitable material, large stones, and other surface obstructions that interfere with seeding.

9.10.5.2. Loosening compacted surface soils where practical.

9.10.5.3. Preparing a firm but friable seedbed.

9.10.5.4. Avoiding excessive smoothing or compaction of slopes.

9.10.5.5. Maintaining roughened surfaces where needed for erosion control.

9.10.5.6. Preserving approved woody material, mulch, erosion-control features, and restoration elements.

9.10.5.7. Soil amendments, fertilizer, lime, compost, or topsoil shall not be applied unless shown on the drawings, recommended by soil testing, or approved by the COR.

9.10.6. Seeding Methods

9.10.6.1. Seed may be installed by broadcast seeding, drill seeding, hydroseeding, hand seeding, or other method approved by the COR.

9.10.6.2. The Contractor shall use methods appropriate for the seed mix, site access, slope, soil moisture, and restoration objective.

9.10.6.3. Seed shall be applied uniformly over the prepared seedbed. Seed shall not be buried too deeply. Small native forb, sedge, rush, and grass seed shall generally be placed at or near the soil surface and lightly incorporated where appropriate.

9.10.6.4. Hydroseeding shall not be used if the method would cause seed to be suspended above the soil surface in mulch without adequate soil contact, unless approved by the COR.

9.10.6.5. After broadcast seeding, the seedbed shall be lightly raked, rolled, tracked, or otherwise treated as appropriate to improve seed-to-soil contact without excessive burial.

9.11. Mulch and Erosion Control

9.11.1. Seeded areas shall be mulched or otherwise stabilized immediately after seeding unless otherwise approved by the COR.

9.11.2. Mulch may consist of clean straw, weed-free hay, Hydromulch, erosion-control blanket, compost blanket, wood fiber, or other approved material appropriate for the location.

9.11.3. Mulch shall be free of noxious weeds, trash, plastic, twine, and deleterious material.

9.11.4. On slopes, channel margins, flow paths, or areas subject to erosion, the Contractor shall install erosion-control blanket, turf reinforcement mat, straw mulch with tackifier, crimped mulch, or other approved stabilization measures as shown on the drawings or directed by the COR.

9.11.5. Mulch and erosion-control materials shall be placed in a manner that does not block drainage, smother wetland plantings, create floatable debris hazards, or interfere with stream restoration features.

9.12. Wetland and Channel-Margin Areas

9.12.1. Wetland Meadow Seed Mix shall be used in wet meadow, riparian, floodplain, channel-margin, seep, low-lying, seasonally saturated, and other wet areas shown on the drawings or directed by the COR.

9.12.2. Seeded wetland areas may be irregular in shape and shall be adjusted in the field based on final grading, observed soil moisture, and anticipated hydrologic conditions.

9.12.3. Seed shall not be placed directly into flowing water. Areas that are too wet to support seedbed preparation shall be seeded by hand, broadcast from adjacent stable ground, or stabilized using other approved methods.

9.13. Upland and Disturbed Access Areas

9.13.1. Mesic to Dry Native Pollinator Seed Mix shall be used in upland disturbed areas, access-road restoration areas, staging and laydown areas, drier slopes, backfilled areas, and other better-drained areas shown on the drawings or directed by the COR.

9.13.2. Where rapid erosion control is needed, the approved cover crop, mulch, erosion-control blanket, or other temporary stabilization measures shall be used in combination with the permanent seed mix.

9.14. Acceptance and Repair

9.14.1. The Contractor shall inspect seeded areas after installation and after major rainfall events during construction. Areas damaged by erosion, settlement, construction traffic, poor seed establishment, washout, sediment deposition, or other disturbance shall be repaired, regraded where necessary, reseeded, mulched, and stabilized at no additional cost to the Government when caused by Contractor operations or failure to protect the work.

9.14.2. Final acceptance shall be based on completion of seeding, mulching, stabilization, cleanup, and correction of visibly eroded, bare, or unstable areas prior to final acceptance of the work.

9.14.3. Because native seed establishment may require more than one growing season, acceptance shall not require full mature native meadow establishment unless a separate establishment or maintenance period is specified.

9.14.4. Measurement and Payment

9.14.4.1. Seeding, cover crop, seedbed preparation, seed mix submittals, seed installation, mulch, tackifier, erosion-control materials, repair of seeded areas damaged by Contractor operations, and related revegetation work shall be measured and paid under the applicable Bid Item F1 Seed, mulch, binder, touch-up (reservoir / disturbed areas).

9.14.4.2. No separate payment will be made for reseeding, additional mulching, or repairing areas damaged by Contractor operations, erosion caused by inadequate stabilization, or failure to complete seeding in accordance with this section.

10. Final Cleanup and Demobilization

10.1. General

10.1.1. Upon completion of dam removal, channel construction, sediment grading, and vegetation establishment activities, the Contractor shall remove all temporary facilities, construction debris, and unused materials from the project site. The project area shall be left in a stable, clean, and orderly condition consistent with the intended restoration objectives.

10.1.2. Measured for payment under Bid Item A1 Mobilization / Demobilization, and Bid Item F3 Final grading and site stabilization, as applicable.

10.2. Removal of Temporary Facilities

10.2.1. The Contractor shall remove temporary construction features including, but not limited to:

10.2.1.1. Temporary staging areas

10.2.1.2. Temporary access improvements not identified for permanent use

10.2.1.3. Construction debris

10.2.1.4. Temporary structures or materials used during construction

10.2.1.5. Any disturbed areas resulting from removal of temporary facilities shall be graded and stabilized.

10.3. Site Restoration

10.3.1. All staging areas, access routes, and disturbed surfaces not required for long-term project use shall be restored to natural grade and stabilized. Restoration shall include:

10.3.1.1. Grading disturbed areas to blend with surrounding terrain

10.3.1.2. Removal of construction debris and excess materials

10.3.1.3. Seeding and stabilization consistent with vegetation establishment requirements.

10.4. Debris and Waste Disposal

10.4.1. Concrete, construction debris, and waste materials shall be removed from the project area and disposed of at approved off-site locations. No construction debris or waste materials shall be buried or left within the reservoir footprint or channel corridor unless specifically approved by the COR.

10.5. As built

10.5.1. Surveyed as-built drawings and reports of all completed work are to be submitted to the COR prior to final approval and are incidental to Bid Item A5 Survey, layout, staking, as-builts.

10.6. Final Inspection

10.6.1. Prior to demobilization, the Contractor shall notify the COR for a final inspection of the project site. Demobilization shall not be considered complete until the Engineer determines that:

10.6.1.1. All construction debris has been removed

10.6.1.2. Disturbed areas have been stabilized

10.6.1.3. The site condition is consistent with the restoration design intent

11. Submittals

11.1. The following submittals shall be provided in addition to those otherwise required by these specifications. No separate payment will be made for preparation, revision, or resubmitting these items unless specifically provided in the Schedule of Items.

11.1.1. At least 15 calendar days prior to construction, submit:

11.1.1.1. Communication Plan

11.1.1.2. Traffic Control Plan

11.1.1.3. Dewatering Plan

11.1.1.4. Erosion & Sediment Control Plan

11.1.1.5. Turbidity and Sediment Control Plan

11.1.1.6. Construction sequencing plan

11.1.1.7. Breach Sequencing and Geometry Plan

11.1.1.8. Temporary Bypass Installation Plan

11.1.1.9. Temporary Access Road and Stream Crossing Plan

11.1.1.10. Concrete Haul, Disposal, and On-Site Reuse Plan, if applicable

11.1.1.11. Spill Prevention and Response Plan

11.1.1.12. Channel Restoration Implementation Plan

11.1.1.13. Material source and placement plan for riprap, grade control stone, streambed simulation material, and channel bedding material

11.1.2. Prior to placement of permanent materials, submit certifications or product information for:

11.1.2.1. Riprap and grade control rock

11.1.2.2. Streambed simulation material and channel bedding material

11.1.2.3. Erosion-control materials, and geotextiles

11.1.2.4. Seed mix and mulch materials.

11.1.2.5. Material certifications shall demonstrate conformance with the plans and specifications, including gradation, durability, and source information where applicable.

11.1.3. Prior to final acceptance, provide as-built information sufficient to document final breach width, final breach invert, channel alignment, grade control locations, downstream turbidity-control reach configuration, and limits of any on-site concrete placement or disposal areas.

12. Temporary Facilities and Controls

The Contractor shall furnish temporary facilities and controls required for access, flow management, worker safety, concrete haul-out, environmental protection, and construction water quality compliance. Incidental to Bid Item A1 Mobilization / Demobilization.

13. Environmental Protection

13.1. Downstream Waters

13.1.1. The Contractor shall protect downstream waters from excessive sediment discharge and shall maintain erosion and sediment control devices during the project. Disturbed areas outside the intended channel and sediment grading zones shall be minimized.

13.1.2. Payment shall be incidental to Bid Item A4 Erosion & sediment controls, installation and maintenance.

13.2. Equipment Fluids and Spill Prevention

13.2.1. All equipment used within the wetted perimeter of the stream, within the temporary bypass area, within the dewatered reservoir channel corridor, or otherwise in locations where leaks could enter surface water shall be in good working condition and free of leaks of lubricants, fuel, coolants, and hydraulic fluids.

13.2.2. Excavators or other hydraulic equipment working in the wetted perimeter or in the constructed stream channel shall use approved biodegradable hydraulic fluid or equivalent fish-friendly hydraulic fluid.

13.2.3. The Contractor shall provide absorbent pads or other approved containment beneath equipment during fueling, servicing, or repair operations. Fueling and servicing shall occur outside the wetted perimeter except in emergencies or as otherwise approved by the COR.

13.2.4. The Contractor shall maintain an oil-spill containment and cleanup kit at the project site at all times during construction. Spill response materials shall be adequate for the equipment and fuel volumes present on site.

13.2.5. Any spill of fuel, oil, hydraulic fluid, or other hazardous material shall be immediately contained, cleaned up, and reported to the COR in accordance with applicable regulations and the approved spill response plan.

13.2.6. Payment for compliance with this subsection shall be incidental to Bid Item A1 Mobilization / Demobilization.

14. Closeout and Site Restoration

14.1. Removal

14.1.1. Temporary facilities, traffic controls, and erosion-control measures shall be removed when no longer needed, except where specified to remain. Disturbed areas shall be graded and stabilized.

14.1.2. Incidental to Bid Item F3 Final grading and site stabilization.

15. Option Additional Breach Width & Upstream Restoration

15.1. Breach Width

15.1.1. In addition to the base breach width shown on the plans, the Government may elect optional widening of the breach to 40 feet. This option shall include demolition of the additional dam width; removal of associated apron and appurtenant concrete within the widened limits; tie-in of breach geometry to the approved profile; additional stabilization, armoring, and grade control made necessary by the widened breach; and associated upstream channel excavation, sediment management, grading, and restoration required to connect the widened breach to the upstream restoration corridor.

15.1.2. The additional excavation will start at station 8+50 and widen gradually to the 40’ breach.

15.1.3. For optional work, the upstream restored channel shall maintain an approximately 22.5-foot bankfull channel width through the upstream reservoir reach as shown on the plans.

15.1.4. Where the elected option increases breach width beyond the base condition, the additional width upstream of the breach shall be expressed primarily as bankfull bench, flood-prone bench, or equivalent overbank transition area adjacent to the 22.5-foot channel, rather than as full-depth widening of the active channel unless approved in writing by the COR.

15.1.5. For a widened breach condition, the Contractor shall grade and stabilize the additional bench or flood-prone width necessary to tie the widened breach into the upstream channel section. This work shall include any additional excavation, shaping, coarse material placement, stabilization, and grading required to construct and hold that widened overbank zone in a stable condition.

15.1.6. Measured only if elected by the Government under the separate optional bid items.

15.1.6.1. Payment will be incidental to Optional Bid Items G. Optional Breach as appropriate.

FIGURE 2: OPTIONAL LARGE WOOD STRUCTURES

Log Jam	Type	Station	Channel Subgrade Elevation	Top Bedding Elevation	Top Structure Elevation	Low Flow Notch Elevation	Structure Width	Root wad Count	Number of Logs
CVLJ-1	Cross Valley	4+80	2143.45	2144.45	2146	2145.5	45	4	10
CVLJ-2	Cross Valley	5+58	2141.35	2142.35	2143.85	2143.1	45	4	10
CVLJ-3	Cross Valley	6+58	2138.85	2139.85	2141.35	2140.6	45	4	10
CVLJ-4	Cross Valley	7+55	2136.69	2137.69	2139.19	2138.44	45	4	10
CVLJ-5	Cross Valley	8+33	2134.89	2135.89	2137.39	2136.64	45	4	10

Log Jam	Type	Station	Channel Subgrade Elevation	Top Bedding Elevation	Top Elevation	Tip Elevation	Structure Length	Root wad Count	Number of Logs
DFLJ-1	Deflector	5+15	2141.85	2142.85	2143.85	2143.35	18	1	3
DFLJ-2	Deflector	5+87	2140.14	2141.14	2142.14	2141.64	18	1	3
DFLJ-3	Deflector	7+19	2136.78	2137.78	2138.78	2138.28	18	1	3