Monte Cristo Mining Area Access Route Log Stringer Bridge
Revisions to Standard FS Specifications
(33% Submittal Package)

FS Specification Section 206 Structural Excavation for Major Structures

206.12 Method.
Delete paragraph (a) and replace with the following paragraph:

(a) Material excavated outside vertical planes located 1 foot outside and parallel to the neat lines of footings or foundations. Use these vertical planes to determine pay quantities, regardless of the amount of material excavated inside or outside these planes.

Delete the paragraph that begins "Measure structural backfill…" and replace with the following paragraph:

Measure structural backfill, and structural backfill for walls, by the cubic yard in place. Limit the volume of structural backfill measured to that placed inside vertical planes located 1 foot outside and parallel to the neat lines of footings or foundations. Use these vertical planes to determine pay quantities, regardless of the amount of backfill material placed outside these planes.

FS Specification Section 251 - Riprap

251.02 Requirements.
The row beginning "Geotextile…" is replaced with the following:

Rirpap Geotextile, Type 2 .....714.01

The following is added to the end of this subsection:

Furnish woven or non-woven geotextile, at the Contractor's option.

251.13 Basis.
Pay Item 251 (13) is replaced with the following Pay Item:

251 (13) Riprap geotextile, type ___ ..... Square Yard

The follow is added after the list of Pay Items:

Payment for excavation required to place riprap will be included in payment for the item "Structural excavation" under Section 206.

FS Specification Section 553A – Precast Concrete Structures

553A.02 Requirements.
Furnish preformed expansion joint filler conforming to AASHTO M213 for separation of precast footings and backwalls.

FS Specification Section 559 - Log Bridges

559.03 Logs.
Log stringers for bridges will be furnished by the Prime Contractor at the Mowich Camp staging area. Contact the Prime Contractor's Authorized Representative not less than 14 days prior to intended use of log stringers to coordinate delivery. Unloading stringers at the staging area, transporting them to their sites of intended use and unloading will be the responsibility of the Bridge Contractor.

FS Specification Section 714 - Geotextile, Geocomposite Drain Material, & Geogrids

714.01 Geotextiles.
The following row is added to subsection (a) Physical Requirements:

(7) Riprap geotextile .....Table 714-7

The following table is added after Table 714-6:

Table 714-7 Geotextile Property Values for Riprap Geotextile *

Geotextile Property	ASTM Test Method	Units	Geotextile Property Requirements			
			Type 1		Type 2	
			Woven	Nonwoven	Woven	Nonwoven
Grab Tensile Strength (minimum) Machine and Cross Machine Directions	D 4632	lb	250	160	315	200
Grab Failure Strain (minimum) Machine and Cross Machine Directions	D 4632	%	< 50	≥ 50	< 50	≥ 50
Tear Strength (minimum)	D 4533	lb	90	56	110	80
Puncture Strength (minimum)	D 6241	lb	495	310	620	430
Apparent Opening Size (AOS) (maximum) U.S. Standard Sieve	D 4751	—	40	40	40	40
Permittivity (minimum)	D 4491	sec^{-1}	0.5	0.5	0.5	0.5
Ultraviolet Stability Retained Strength (minimum)	D 4355 (at 500 hours)	%	70	70	70	70
* Woven slit film geotextiles (geotextiles that are made from yarns of a flat, tape-like character) are not acceptable.						

Section 206—Structural Excavation for Major Structures

Description

206.01 Work. Excavate, backfill, and dispose of material for the construction of structures. Preserve channels; shore and brace; construct cofferdams; seal foundations; dewater; excavate; prepare foundations; backfill; and subsequently remove safety features and cofferdams.

Materials

206.02 Requirements. Ensure that material conforms to specifications in the following sections and subsections:

Foundation Fill	704.01
Structural Backfill	704.04
Structural Concrete	552

Construction

206.03 Preparation for Structural Excavation. Clear the area of vegetation and obstructions according to Sections 201 and 202.

When structural excavation is to be measured and paid for by the cubic meter, notify the CO sufficiently before beginning any clearing, grubbing, or excavation so that cross-sectional measurements of the undisturbed ground may be taken. Do not disturb the natural ground adjacent to the structure until authorized by the CO.

206.04 General. Consider the elevations of the bottoms of footings or foundations when SHOWN ON THE DRAWINGS to be approximate elevations. The CO may order, in writing, changes in the elevations of footings and foundations when necessary to secure a satisfactory foundation.

Excavate trenches or foundation pits to a width and length that allows room for work. Provide a firm foundation of uniform density throughout its length and width. Do not place footings until the depth of excavation and the foundation material have been approved in writing.

Where necessary to blast rock, blast according to Section 220.

Follow Occupational Safety and Health Administration (OSHA) safety regulations (29 CFR, part 1926, subpart P, Excavation), or OSHA-approved State Plan requirements for sloping the sides of excavations and for using shoring, bracing, and

other safety features. When sides of excavations are sloped for safety considerations, provide one copy of the design that demonstrates conformity with OSHA regulations. Submit working drawings and construction details when required by the SPECIAL PROJECT SPECIFICATIONS where support systems, shield systems, or other protective systems are used. Ensure that drawings demonstrate conformity with regulations.

Remove safety features when no longer necessary. Remove shoring and bracing to at least 300 mm below the surface of the finished ground.

Saw cut existing pavements or concrete structures that are adjacent to the area to be excavated and are designated to remain.

Conserve suitable material for structural backfill from excavated material. Do not deposit excavated material in or near a waterway. Do not stockpile excavated material closer than 1 m from the edge of the excavation.

Place unsuitable or excess material according to Subsection 203.06. If approved, suitable material may be used in embankment construction.

Remove all water as necessary to perform work.

206.05 Channel Preservation. Perform work in or next to a running waterway as follows:

(a) Excavate inside cofferdams, sheeting, or other approved separations such as dikes or sandbags.

(b) Do not disturb the natural bed of the waterway adjacent to the work.

(c) Backfill the excavation with structural backfill to original groundline.

(d) Do not pump water from foundation excavations directly into live streams. Pump water into settling areas as SHOWN ON THE DRAWINGS or as approved.

206.06 Cofferdams. Use cofferdams when excavating under water or when the excavation is affected by groundwater.

Submit three working copies of drawings and calculations 21 days prior to installation, showing proposed methods and construction details of cofferdams. Place seal and signature of a licensed professional engineer on the drawings and calculations.

Shore and construct cofferdams according to OSHA standards. Ensure that cofferdams:

(a) Extend below the bottom of the footing.

(b) Are braced to withstand expected pressures and loads without buckling, and are secured in place to prevent tipping or movement.

(c) Are as watertight as practicable.

(d) Provide sufficient clearance for the placement of forms and the inspection of their exteriors.

(e) Provide for dewatering.

(f) Protect fresh concrete against damage from sudden rises in water elevation.

(g) Prevent damage to the foundation by erosion.

When no longer required, remove all cofferdam material down to the natural bed of the waterway. Remove cofferdam material outside the waterway to a minimum of 300 mm below the surface of the finished ground.

Do not disturb, damage, or mar finished structure. Remove all timber or bracing in the cofferdam that extends into substructure masonry.

206.07 Foundation Seal. Construct a foundation seal of seal-concrete where a foundation area cannot be pumped reasonably free of water, and/or where the substructure concrete cannot be placed in accordance with Section 552.

While placing a foundation seal, maintain the water level inside the cofferdam at the same level as the water outside the cofferdam. Where a foundation seal is placed in tidal water or in a stream subject to sudden water level increases, vent or port the cofferdam at low water level.

Do not dewater a concrete-sealed cofferdam until the concrete strength is sufficient to withstand the hydrostatic pressure.

206.08 Dewatering. While placing concrete, locate and operate the pumps outside the foundation form. If pumping is permitted from the interior of any foundation enclosure, pump in a manner to avoid removal or disturbance of concrete material.

206.09 Foundation Preparation. Prepare footing foundations as follows:

(a) Footings Placed on Bedrock. Cut the bottom of the excavation to the specified elevations. Clean the foundation surface of loose or disintegrated material. Clean and grout all open seams and crevices that will remain beneath the footing.

(b) Footings Placed on an Excavated Surface Other Than Bedrock. Do not disturb the bottom of the foundation excavation. Remove material to foundation grade and compact the foundation immediately before concrete is placed. Treat material below the foundation grade that is disturbed as unstable material (see Subsection 206.09(d)).

(***c) Footings Keyed Into Undisturbed Material.*** Excavate the foundation to the neat lines of the footing and compact the foundation. Where material does not stand vertically, fill all space between the neat lines of the footing and the remaining undisturbed material with concrete. If the top of the excavation is below the top of the footing, fill only to the top of the excavation; otherwise, fill to the top of the footing. Concrete placed against steel sheet piles in cofferdams is considered to be against undisturbed material.

(d) Unstable Material Below Footing Elevation. Excavate unstable material below foundation grade to the depth and lateral extent as approved, and replace it with foundation fill. Place foundation fill material in horizontal layers that, when compacted, do not exceed 150 mm in depth. Compact each layer according to Subsection 206.11.

(e) Foundations Using Piles. Excavate to the foundation elevation and drive the piles. Remove all loose and displaced material and reshape the bottom of the excavation to the foundation elevation. Smooth and compact the bed to receive the footing.

206.10 Backfill. Backfill structural excavation with structural backfill material.

Place structural backfill in horizontal layers that, when compacted, do not exceed 150 mm in depth. Compact each layer according to Subsection 206.11.

Do not place backfill or embankment behind the walls of concrete culverts or abutments of rigid frame structures until the top slab has been placed and cured. For all structures held at the top by the superstructure and behind the sidewalls of concrete culverts, bring backfill and embankment up evenly behind opposite abutments or sidewalls.

Do not place rock that is greater than 150 mm in its largest dimension within any backfill or embankment that is within 1 m of any structure.

Extend each layer to the limits of the excavation or to natural ground.

Do not place backfill against concrete that is less than 7 days old, or until 90 percent of the design strength is achieved.

206.11 Embankment. Construct all embankments, and backfill in horizontal layers adjacent to structures. Compact backfill in accordance with Subsection 203.16(b), method 4, except that mechanical tampers may be used for the required compaction. Use special care to prevent wedging action against the structure. Bench all slopes that bound or are within the areas to be backfilled to prevent wedging action. Extend compacted material horizontally for a distance at least equal to the height of the substructure or wall that is to be backfilled against, except where undisturbed material remains within the area.

Measurement

206.12 Method. Use the method of measurement that is DESIGNATED IN THE SCHEDULE OF ITEMS.

Measure structural excavation by the cubic meter that is in place in its original position. Do not include the following volumes in structural excavation:

(a) Material excavated outside vertical planes located 450 mm outside and parallel to the neat lines of footings or foundations. Use these vertical planes to determine pay quantities, regardless of the amount of material excavated inside or outside these planes.

(b) Any material included within the staked limits of the roadway excavation, such as contiguous channel changes and ditches, for which payment is otherwise provided in the contract.

(c) Water or other liquid material.

(d) Material excavated before the survey of elevations and measurements of the original ground.

(e) Material rehandled, except when the contract specifically requires excavation after embankment placement.

(f) Material excavated for footings or foundations at a depth more than 1.5 m below the lowest elevation for such footings or foundations, as shown on the plans.

Measure foundation fill, when DESIGNATED IN THE SCHEDULE OF ITEMS, by the cubic meter in place.

Measure structural backfill, and structural backfill for walls, by the cubic meter in place. Limit the volume of structural backfill measured to that placed inside vertical planes located 450 mm outside and parallel to the neat lines of footings or foundations. Use these vertical planes to determine pay quantities, regardless of the amount of backfill material placed outside these planes.

Measure work for shoring and bracing and for cofferdams on a lump-sum basis for all work needed to complete excavation to a depth of 1.5 m below the lowest elevation, as SHOWN ON THE DRAWINGS, for each foundation structure.

Payment

206.13 Basis. The accepted quantities will be paid for at the contract unit price for each PAY ITEM DESIGNATED IN THE SCHEDULE OF ITEMS.

Excavation for footings or foundations, shoring and bracing, and cofferdams at depths more than 1.5 m below the lowest elevation for such footing or foundation as SHOWN ON THE DRAWINGS will be paid for by design change.

Payment will be made under:

Pay Item		Pay Unit
206 (01)	Structural excavation	Cubic Meter
206 (02)	Foundation fill	Cubic Meter
206 (03)	Structural backfill	Cubic Meter
206 (04)	Structural backfill for walls	Cubic Meter
206 (05)	Shoring and bracing	Lump Sum
206 (06)	Cofferdams	Lump Sum
206 (07)	Structural excavation	Lump Sum

DIVISION 250
Structural Embankments

Section 251—Riprap

Description

251.01 Work. Furnish and place riprap for bank protection, slope protection, drainage structures, and erosion control.

Riprap classes are designated as shown in table 705-1.

Materials

251.02 Requirements. Provide materials that conform to requirements in the following subsections:

Geotextiles, Type IV (A, B, C, D, E, or F)	714.01
Mortar for Masonry Beds & Joints	712.05
Riprap Rock	705.02
Rock for Hand-Placed Embankments	705.05
Granular Backfill	703.03

Provide gravel cushion that meets the gradation requirements SHOWN ON THE DRAWINGS and the quality requirements specified in Subsection 703.06.

Construction

251.03 General. Minimize ground disturbance where practicable in preparing for placement of riprap. Prepare surfaces by removing logs, cutting brush and stumps flush with the ground, or as SHOWN ON THE DRAWINGS. Remove all soft or spongy material to the depths SHOWN ON THE DRAWINGS and replace it with approved material. Perform structural excavation and backfill as specified in Section 206A. Place geotextile as SHOWN ON THE DRAWINGS.

Control gradation by visual inspection. When SHOWN ON THE DRAWINGS, provide two samples of the specified class of rock. Each sample shall be at least 4.5 t or 10 percent of the total riprap weight, whichever is less. Provide one sample at the construction site, which may be a part of the finished riprap covering. Provide the other sample at the quarry. Use these samples as a frequent reference for judging the gradation of the riprap supplied. When specified in the SPECIAL PROJECT SPECIFICATIONS, provide mechanical equipment at the sorting site and the labor needed to assist in checking gradation.

251.04 Placed Riprap. Placed riprap is rock placed on a prepared surface to form a well-graded mass.

(a) Method A, Machine Placed. Place riprap to its full thickness in one operation to avoid displacing the underlying material. Do not place riprap material by methods that cause segregation or damage to the prepared surface. Place or rearrange individual rocks by mechanical or manual methods to obtain a compact uniform blanket with a reasonably smooth surface.

(b) Method B, End Dumped. Dump riprap to its full thickness in one operation. Avoid displacing the underlying material. Distribute larger rocks throughout the mass of stone. Obtain a uniformly thick blanket with a reasonably smooth surface.

251.05 Keyed Riprap. Keyed riprap is rock placed on a prepared surface and keyed into place by striking with a flat-faced weight.

Place rock for keyed riprap according to Subsection 251.04. Key the riprap into place by striking the surface with a 1.2 x 1.5-m flat-faced weight that weighs approximately 2,000 kg. Do not strike riprap below the water surface.

251.06 Mortared Riprap. Mortared riprap is rock placed on a prepared surface with the voids filled with Portland cement mortar.

Place rock for mortared riprap according to Subsection 251.04. Thoroughly moisten the rocks and wash any excess fines to the underside of the riprap. Place mortar only when the temperature is above 2 °C and rising. Place the mortar in a manner to prevent segregation. Fill all voids without unseating the rocks. Provide weep holes through the riprap as SHOWN ON THE DRAWINGS. Protect the mortared riprap from freezing and keep it moist for 3 days after the work is completed.

Where the depth SHOWN ON THE DRAWINGS for grouting is in excess of 300 mm, place the riprap in lifts of 300 mm or less. Grout each lift prior to placing the next lift. Construct and grout the succeeding lifts before the grout in the previous lift has hardened.

251.07 Sacked Concrete Riprap. Ensure that type A and type B sacked concrete riprap is prepared as described below.

(a) Type A. Prepare concrete containing at least 195 kg of cement per cubic meter; aggregate with a maximum size of 60 mm; and water limited to that necessary to ensure good workability without loss of cement by seepage through the sacks. Use reasonably clean and strong aggregate of appropriate size gradation. Use sacks that are at least 310 g/m^2 burlap, with a 1,016-mm width, or equivalent. Ensure that minimum weight of the filled sack is 25 kg. Place sacks while contents are moist. Premixed concrete that meets the requirements specified in this section is acceptable.

Loosely place the sacks, filled with concrete, to leave room for folding at the top. Make the fold just enough to retain the concrete at time of placing. Immediately after filling the sacks with concrete, place and lightly trample them to cause them to conform with the earth face and with adjacent sacks.

Remove all dirt and debris from the top of the sacks before the next course is laid thereon. Place stretchers so the folded ends will not be adjacent. Place headers with the folds toward the earth face. Do not place more than four vertical courses of sacks in any tier until initial set has taken place in the first course of any such tier.

(b) Type B. Provide type B (premixed) sacked concrete riprap containing commercially packaged dry combined materials for concrete. Ensure that each sack weighs at least 30 kg; is about 300 x 450 x 150 mm in size; and is strong enough for the mass of concrete it contains and free of tears and imperfections. Ensure that the concrete has not taken an initial set prior to placing.

Place and lightly compress sacks to cause them to conform with the earth surface and with adjacent sacks. When more than one layer of sacks is required, stagger joints one-half sack width. Do not place more than four vertical courses (one tier) of sacks until initial set has taken place in the first course of any such tier.

After placement, penetrate each sack at least six times from the top through the entire sack thickness, leaving at least a 13- to 25-mm-diameter void in the concrete mixture. Do not damage the sack through these penetrations to the extent that the concrete mixture is spilled or wasted.

When there will not be proper bearing or bond for the concrete because of delays in placing succeeding layers of sacks or because the work is hampered by storms, mud, or other causes, excavate a small trench behind the row of sacks already in place, and fill the trench with fresh concrete before laying the next layer of sacks.

Keep sacked concrete riprap moist and protected from freezing for a period of 4 days after placement.

251.08 Sacked Soil Cement Riprap. Sacked soil cement riprap may be composed of any combination of gravel, sand, silt, and clay with the following limitations: do not use topsoil; ensure that at least 55 percent of the mixed soil passes the 4.75-mm (no. 4) sieve, and that not more than 15 percent passes the 75-µm (no. 200) sieve; and ensure that the maximum size gravel passes the 37.5-mm sieve. Pulverize the soil so that no lumps exceed 13 mm in diameter. Thoroughly and uniformly mix the cement, soil, and water before placing in sacks. Limit moisture content to that necessary for good mixing without seepage. Provide sacks that are at least 310 g/m^2 burlap, with a 1,016-mm width, or

equivalent. Ensure that the minimum weight of the filled sack is 25 kg. Place sacks while contents are moist.

The cement requirements in percent by volume for each soil group are shown below:

AASHTO Classification (M 145) Soil Group	Percent Cement by Volume
A-1-a	7
A-1-b	9
A-2	10
A-3	12
A-4	12
A-5	13
A-6	14
A-7	15

251.09 Hand-Placed Riprap. Securely bed the rock. Use spalls and small rocks to fill voids. Fill any spaces in back of the hand-placed riprap with compacted material.

251.10 Granular Filter Blanket. Place a sheathing material as specified in Subsection 703.04 where SHOWN ON THE DRAWINGS to the full specified thickness of each layer in one operation, using methods that will not cause segregation of particle sizes within the layer. Ensure that the surface of the finished layer is reasonably even and free of mounds or windrows. Place additional layers of filter material in a manner that will not cause mixture of the material in the different layers.

251.11 Geotextile. Place the geotextile as SHOWN ON THE DRAWINGS. Provide surfaces upon which the geotextile is to be placed with a uniform slope, and make them reasonably smooth and free of obstructions, depressions, and debris that could damage the geotextile. Have the surfaces approved before placing geotextile.

Loosely lay the geotextile without wrinkles or creases. Sew or overlap adjacent strips at joints. Insert securing pins through both strips of overlapped geotextile at maximum intervals of 900 mm, but not closer than 50 mm to each edge. Prevent the geotextile from being displaced.

Have the installed geotextile approved before covering with granular backfill or other materials. Carefully place the granular backfill on the geotextile to the depth SHOWN ON THE DRAWINGS by methods that will not damage the geotextile. Do not drop riprap placed on the granular backfill a distance greater than 900 mm.

Measurement

251.12 Method. Use the method of measurement that is DESIGNATED IN THE SCHEDULE OF ITEMS.

Payment

251.13 Basis. The accepted quantities will be paid for at the contract unit price for each PAY ITEM IN THE SCHEDULE OF ITEMS.

Payment will be made under:

Pay Item	Pay Unit
251 (01) Placed riprap, class _____, method _____	Cubic Meter
251 (02) Placed riprap, class _____, method _____	Ton
251 (03) Placed riprap, class _____, method _____	Square Meter
251 (04) Keyed riprap, class _____	Cubic Meter
251 (05) Keyed riprap, class _____	Ton
251 (06) Mortared riprap, class _____	Cubic Meter
251 (07) Sacked concrete riprap, type _____	Square Meter
251 (08) Sacked concrete riprap, type _____	Cubic Meter
251 (09) Sacked soil cement riprap	Square Meter
251 (10) Sacked soil cement riprap	Cubic Meter
251 (11) Granular filter blanket	Cubic Meter
251 (12) Hand-placed riprap	Square Meter
251 (13) Geotextile, type IV, _____	Square Meter

Section 553A—Precast Concrete Structures

Description

553A.01 Work. Construct precast concrete members. In addition, manufacture, test materials for, transport, store, and install all precast concrete portions except piling, and perform all necessary grouting, welding, or other connections. Furnish precast concrete members complete and in place, including all concrete reinforcing steel and incidentals connected therewith.

Materials

553A.02 Requirements. Provide materials that meet the requirements specified in the following subsections:

Elastomeric Bearing Pads	717.10
High-Strength Nonshrink Grout	701.02
Low-Strength Grout	701.03
Mortar	701.04
Reinforcing Steel	709.01
Sealants, Fillers, Seals, & Sleeves	712.01
Structural Concrete	552.02
Structural Steel	717.01

Provide precast concrete members of the size, shape, strength, air content, and finish that are SHOWN ON THE DRAWINGS.

Perform all sampling, testing, and inspection necessary to ensure quality control of the component materials and the concrete. Sample and test for quality control and acceptance testing in accordance with the AASHTO or ASTM test methods prescribed in Section 552.

Maintain adequate records of all inspections and tests. Keep records that indicate the nature and number of observations made, the number and type of deficiencies found, the quantities approved and rejected, and the nature of any corrective action taken.

Sample and test every batch (100 percent sampling and testing) for air content and slump at the start of concrete production. Random sampling and testing for air con-tent and slump at the rate of one for every five successive batches may be substituted for 100 percent sampling and testing if the test results for three

successive batches are within the specification limitations for air content or slump; but reinstate 100 percent sampling and testing if a test result for any random sample is outside the specification limitations for either air content or slump.

Make compression tests to determine the minimum strength requirements on cylinders. Make a minimum of four cylinders from each day's production, and cure them in the same manner as the precast units. Use testing methods in accordance with AASHTO T 22.

Furnish, or have the supplier furnish, a Certificate of Compliance to the CO certifying that the above materials comply with the applicable specifications. In addition, furnish to the CO a copy of all test results performed by the Contractor or supplier that are necessary to ensure compliance.

Construction

553A.03 Performance. Construct precast concrete structural members in accordance with the following sections and subsections, as applicable:

Erecting and Placement of Multibeam Members	553.09
Reinforcing Steel	554
Storing, Transporting, & Erecting	553.08
Structural Concrete	552

Submit four sets of shop drawings to the CO for approval, including the concrete mix design for each class of concrete proposed for use, a minimum of 21 days before fabrication of the precast member(s).

553A.04 Casting Yard. The precasting of concrete structural members may be done at a casting yard location selected by the Contractor.

553A.05 Handling, Transporting, & Erecting. Provide additional reinforcement, as needed, to meet the requirements of handling, transporting, and erecting precast members.

Measurement

553A.06 Method. Use the method of measurement that is DESIGNATED IN THE SCHEDULE OF ITEMS.

Each member will include the concrete, reinforcement steel, anchorages, plates, nuts, and other material contained within or attached to the unit.

Payment

553A.07 Basis. The accepted quantities will be paid for at the contract unit price for each PAY ITEM DESIGNATED IN THE SCHEDULE OF ITEMS.

Pay Item		Pay Unit
553A (01)	Precast concrete member, _____ *Description*	..... Each
553A (02)	Precast concrete structure, _____ *Description*	..... Lump Sum

Section 559—Log Bridges

Description

559.01 Work. Furnish, fabricate, and install the logs and timber for constructing log bridges, including abutments, piers, and superstructure. In addition, furnish and install all hardware and other required material.

Materials

559.02 Requirements. Furnish materials that conform to specifications in the following section and subsections:

Geotextiles	714.01
Reinforcing Steel	554
Structural Concrete	552
Timber Structures	557

559.03 Logs. Furnish logs used for stringers within the dimensional tolerance and of the species SHOWN ON THE DRAWINGS. They must be of high quality, straight, sound, and free of wind shake, decay, or excessive twist (spiral grain with a slope of grain relative to the longitudinal axis of the log exceeding 1 in 8). Ensure that knots in the middle half of the stringer length do not significantly affect structural capacity.

If SHOWN ON THE DRAWINGS, peel logs and provide preservative treatment as SHOWN ON THE DRAWINGS. Obtain written approval from the CO for all logs to be used in the structure.

559.04 Timber & Lumber. Furnish structural lumber and timber in accordance with the species, grades, and dimensions SHOWN ON THE DRAWINGS and in accordance with Section 557.

559.05 Aggregate. When required, furnish aggregate for decking or surfacing to meet the requirements SHOWN ON THE DRAWINGS.

Construction

559.06 General. Perform excavation, foundation, backfill, and embankment work specified in Sections 203 and 206, as applicable.

Handle all logs and timber carefully to prevent damage to the wood and/or preservative treatment.

Dispose of all debris resulting from operations in accordance with Section 202.

Construct abutments and pier as SHOWN ON THE DRAWINGS.

559.07 Performance. Construct bridge superstructure and substructures as SHOWN ON THE DRAWINGS, with attention paid to the details of erection, fit-up, and connection. Obtain written approval for all deviations from the CO.

Place timber caps to obtain even and uniform bearing over the tops of supporting posts or piles and with post and pile ends in true alignment. Secure all caps as SHOWN ON THE DRAWINGS.

Match stringers for size at the bearings and place them in position so that the crown is up. Alternate stringers butt to tip. Locate any knots that may affect the strength of the member in the top portion of the stringer.

Cut stringers to length with a square cut. Remove sufficient material from the top surface of the log stringer to provide an adequate bearing area for the decking as SHOWN ON THE DRAWINGS. Do not allow hewing to exceed 19 mm in depth at the small end of the log. Do not allow hewing of the top of the butt end to exceed 75 mm in depth for a distance not to exceed one-fourth span length.

Cut or hew the bottom surface of the small end of the stringer logs only to the depth necessary to achieve the required bearing area. Block or shim tip ends that are smaller than the largest tip. Cut or dap butt ends to the depth of the largest top end. Allow the maximum slope of any dap to be 1 to 10. Make top and bottom cuts parallel. Require shims or blocks used under small ends to cover the entire bearing area.

Notch all logs together, including face logs, tie logs, mud sills, and anchor logs as SHOWN ON THE DRAWINGS, and drift pin all connections.

Use an approved type of suitable granular, free-draining material and/or rock for backfill when crib abutments are to be constructed.

Use tiebacks or other abutment anchoring devices as SHOWN ON THE DRAWINGS or as approved in writing by the CO.

Measurement

559.08 Method. Use the method of measurement that is DESIGNATED IN THE SCHEDULE OF ITEMS.

When untreated and treated timber and lumber is measured, measure by the cubic meter of timber and lumber in place in the completed structure. Compute the quantities from nominal cross section dimensions and actual lengths.

When bridge railing is measured, measure under Subsection 556.11. When concrete is measured, measure under Subsection 552.21.

Measure log bridges on a lump sum basis, including all work necessary to furnish, prepare, and install the log portions of the bridge superstructure and substructure units.

Payment

559.09 Basis. The accepted quantities will be paid for at the contract unit price for each PAY ITEM DESIGNATED IN THE SCHEDULE OF ITEMS.

Payment will be made under:

Pay Item		Pay Unit
559 (01)	Log bridge	Lump Sum

Section 714—Geotextile, Geocomposite Drain Material, & Geogrids

714.01 Geotextiles

Use long-chain synthetic polymers composed by weight of at least 95 percent polyolefins or polyesters to manufacture geotextile or the threads used to sew geotextiles. Form the geotextiles, including selvedges, into a stable network such that the filaments or yarns retain their dimensional stability relative to each other.

(a) Physical Requirements. For the specified type, see the following tables:

(1) Subsurface drainage, type I (A–F) ..... Table 714-1

(2) Separation, type II (A–C) ..... Table 714-2

(3) Stabilization, type III (A–B) ..... Table 714-3

(4) Permanent erosion control, type IV (A–F) ..... Table 714-4

(5) Temporary silt fence, type V (A–C) ..... Table 714-5

(6) Paving fabric, type VI ..... Table 714-6

All property values in these specifications, with the exception of apparent opening size (AOS), represent minimum average roll values in the weakest principal direction (i.e., ensure that average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the specified values). Values for AOS represent maximum average roll values.

Elevate and protect rolls with a waterproof cover if stored outdoors. When using a geotextile for a permanent installation, limit the geotextile exposure to ultraviolet radiation to less than 10 days.

(b) Evaluation Procedures. Furnish a product certification, including the name of the manufacturer, product name, style number, chemical composition of the filaments or yarn, and other pertinent information to fully describe the geotextile.

When samples are required, remove a 1-m-long full-width sample from beyond the first outer wrap of the roll. Label the sample with the lot and batch number, date of sampling, project number, item number, manufacturer name, and product name.

Table 714-1.—Physical requirements for subsurface drainage geotextile.

Property	Test Method	Units	Specifications[a]					
			Type I-A	Type I-B	Type I-C	Type I-D	Type I-E	Type I-F
Grab strength	ASTM D 4632	N	1,100/700	1,100/700	1,100/700	800/500	800/500	800/500
Sewn seam strength	ASTM D 4632	N	990/630	990/630	990/630	720/450	720/450	720/450
Tear strength	ASTM D 4533	N	400[c]/250	400[c]/250	400[c]/250	300/175	300/175	300/175
Puncture strength	ASTM D 4833	N	400/250	400/250	400/250	300/175	300/175	300/175
Burst strength	ASTM D 3786	kPa	2,700/1,300	2,700/1,300	2,700/1,300	2,100/950	2,100/950	2,100/950
Permittivity	ASTM D 4491	s^{-1}	0.5	0.2	0.1	0.5	0.2	0.1
Apparent opening size	ASTM D 4751	mm	0.45[b]	0.25[b]	0.22[b]	0.45[b]	0.25[b]	0.22[b]
Ultraviolet stability	ASTM D 4355	%	50[d]	50[d]	50[d]	50[d]	50[d]	50[d]

a. The first values in a column apply to geotextiles that break at < 50 percent elongation (ASTM D 4632). The second values in a column apply to geotextiles that break at • 50 percent elongation (ASTM D 4632).
b. Maximum average roll value.
c. The minimum average roll tear strength for woven monofilament geotextile is 245 N.
d. After 500 hours of exposure.

Table 714-2.—Physical requirements for separation geotextile.

Property	Test Method	Units	Specifications[a] Type II-A	Type II-B	Type II-C
Grab strength	ASTM D 4632	N	1,400/900	1,100/700	800/500
Sewn seam strength	ASTM D 4632	N	1,260/810	990/630	720/450
Tear strength	ASTM D 4533	N	500/350	400[c]/250	300/180
Puncture strength	ASTM D 4833	N	500/350	400/250	300/180
Burst strength	ASTM D 3786	kPa	3,500/ 1,700	2,750/ 1,300	2,100/950
Permittivity	ASTM D 4491	s^{-1}	0.02	0.02	0.02
Apparent opening size	ASTM D 4751	mm	0.60[b]	0.60[b]	0.60[b]
Ultraviolet stability	ASTM D 4355	%	50[d]	50[d]	50[d]

a. The first values in a column apply to geotextiles that break at < 50 percent elongation (ASTM D 4632). The second values in a column apply to geotextiles that break at • 50 percent elongation (ASTM D 4632).
b. Maximum average roll value.
c. The minimum average tear strength for woven monofilament geotextile is 245 N.
d. After 500 hours of exposure.

Table 714-3.—Physical requirements for stabilization geotextile.

Property	Test Method	Units	Specifications[a] Type III-A	Type III-B
Grab strength	ASTM D 4632	N	1,400/900	1,100/700
Sewn seam strength	ASTM D 4632	N	1,260/810	990/630
Tear strength	ASTM D 4533	N	500/350	400[c]/250
Puncture strength	ASTM D 4833	N	500/350	400/250
Burst strength	ASTM D 3786	kPa	3,500/1,700	2,750/1,300
Permittivity	ASTM D 4491	s^{-1}	0.05	0.05
Apparent opening size	ASTM D 4751	mm	0.43[b]	0.43[b]
Ultraviolet stability	ASTM D 4355	%	50[d]	50[d]

a. The first values in a column apply to geotextiles that break at < 50 percent elongation (ASTM D 4632). The second values in a column apply to geotextiles that break at • 50 percent elongation (ASTM D 4632).
b. Maximum average roll value.
c. The minimum average tear strength for woven monofilament geotextile is 245 N.
d. After 500 hours of exposure.

Table 714-4.—Physical requirements for permanent erosion control geotextile.

Property	Test Method	Units	Specifications[a]					
			Type IV-A	Type IV-B	Type IV-C	Type IV-D	Type IV-E	Type IV-F
Grab strength	ASTM D 4632	N	1,400/900	1,400/900	1,400/900	1,100/700	1,100/700	1,100/700
Sewn seam strength	ASTM D 4632	N	1,260/810	1,260/810	1,260/810	990/630	990/630	990/630
Tear strength	ASTM D 4533	N	500/350	500/350	500/350	400[c]/250	400[c]/250	400[c]/250
Puncture strength	ASTM D 4833	N	500/350	500/350	500/350	400/250	400/250	400/250
Burst strength	ASTM D 3786	kPa	3,500/1,700	3,500/1,700	3,500/1,700	2,750/1,300	2,750/1,300	2,750/1,300
Permittivity	ASTM D 4491	s^{-1}	0.7	0.2	0.1	0.7	0.2	0.1
Apparent opening size	ASTM D 4751	mm	0.43[b]	0.25[b]	0.22[b]	0.43[b]	0.25[b]	0.22[b]
Ultraviolet stability	ASTM D 4355	%	50[d]	50[d]	50[d]	50[d]	50[d]	50[d]

a. The first values in a column apply to geotextiles that break at < 50 percent elongation (ASTM D 4632). The second values in a column apply to geotextiles that break at • 50 percent elongation (ASTM D 4632).
b. Maximum average roll value.
c. The minimum average roll tear strength for woven monofilament geotextile is 245 N.
d. After 500 hours of exposure.

Table 714-5.—Physical requirements for temporary silt fence.

Property	Test Method	Units	Specifications Type V-A	Type V-B [b]	Type V-C [c]
Maximum post spacing	–	m	1.2	1.2	2
Grab strength:					
Machine direction	ASTM D 4632	N	400	550	550
Cross direction		N	400	450	450
Permittivity	ASTM D 4491	s^{-1}	0.05	0.05	0.05
Apparent opening size	ASTM D 4751	mm	0.60 [a]	0.60 [a]	0.60 [a]
Ultraviolet stability	ASTM D 4355	%	70 [d]	70 [d]	70 [d]

a. Maximum average roll value.
b. Elongation at break • 50 percent elongation (ASTM D 4632).
c. Elongation at break < 50 percent elongation (ASTM D 4632).
d. After 500 hours of exposure.

Table 714-6.—Physical requirements for paving fabric.

Property	Test Method	Units	Specifications Type VI
Grab strength	ASTM D 4632	N	500
Ultimate elongation	ASTM D 4632	N	50% at break
Asphalt retention	Texas DOT item 3099	L/m^2	0.90
Melting point	ASTM D 276	°C	150

In addition, when geotextile joints are sewn, submit the seam assembly description and a sample of the sewn material. In the description, include the seam type, seam allowance, stitch type, sewing thread tex ticket number(s) and type(s), stitch density, and stitch gage. If the production seams are sewn in both the machine and cross-machine directions, provide sample sewn seams that are oriented in both the machine and cross-machine directions. Furnish a sewn sample that has a minimum 2 m of sewn seam and is at least 1.5 m in width. Sew the sample seams with the same equipment and procedures that are used to sew the production seams. Ensure that seams sewn onsite conform to the manufacturer's recommendations and are approved before installation.

714.02 Geocomposite Drains

Geocomposite drains consist of a polymeric drainage core with a geotextile conforming to Subsection 714.01(a)(1) attached to or encapsulating the core. Ensure that the geocomposite drain includes all necessary fittings and material to splice one

sheet, panel, or roll to the next and to connect the geocomposite drain to the collector and outlet piping.

Fabricate the drainage core in sheet, panel, or roll form of adequate strength to resist installation stresses and long-term loading conditions. Furnish core material that consists of long chain synthetic polymers composed by weight of at least 85 percent polypropylene, polyester, polyamide, PVC, polyolifin, or polystyrene. Build the core up in thickness by means of columns, cones, nubs, cusps, meshes, stiff filaments or other configurations.

Ensure that geocomposite drains have a minimum compressive strength of 275 kPa when tested in accordance with ASTM D 1621, procedure A. Ensure that all splices, fittings, and connections have sufficient strength to maintain the integrity of the system during construction handling and permanent loading, and do not impede flow or damage the core.

Identify, ship, and store the geocomposite drains in accordance with AASHTO M 288. Elevate and protect sheets, panels, and rolls with a waterproof and ultra-violet-resistant cover if stored outdoors.

When using a geocomposite drain for a permanent installation, limit the geocomposite exposure to ultraviolet radiation to less than 10 days.

When samples are required, provide a 1-m-square sample from products supplied as sheets or panels, or a 1-m-length full-roll-width sample from products supplied in rolls. Label the sample with the lot and batch number, date of sampling, project number, item number, manufacturer's name, and product name.

(a) Geocomposite Underdrains. Ensure that the horizontal and vertical flow of water within the core interconnects at all times for the full height of the core, and water can pass from one side of the core to the other. Ensure that the drainage core with the geotextile in place provides a minimum flow rate of 0.1 L/s/m of width when tested in accordance with ASTM D 4716 under the following test conditions:

(1) A specimen 300 mm long.

(2) An applied load of 69 kPa.

(3) A gradient of 0.1.

(4) A 100-hour seating period.

(5) A closed-cell foam rubber between platens and geocomposite.

Firmly attach the geotextile to the core so folding, wrinkling, and other movement cannot occur either during handling or after placement. Achieve bonding using nonwater-soluble adhesive, heat sealing, or another method recommended by the manufacturer. Do not use adhesive on areas of the geotextile fabric where flow is intended to occur.

If heat sealing is used, do not weaken the geotextile below the required strength values. Extend the geotextile below the bottom of the core far enough to completely encapsulate the collector pipe.

(b) Geocomposite Sheet Drains. Ensure that the horizontal and vertical flow of water within the sheet drain interconnects at all times for the full height of the core. Ensure that the drainage core with the geotextile in place provides a minimum flow rate of 0.1 liters per second per meter of width when tested in accordance with ASTM D 4716 under the following test conditions:

(1) A specimen 300 mm long.

(2) An applied load of 69 kPa.

(3) A gradient of 0.1.

(4) A 100-hour seating period.

(5) A closed-cell foam rubber between platens and geocomposite.

If core construction separates the flow channel into two or more sections, only the flow rate on the inflow face is considered in determining the core's acceptability.

Firmly attach the geotextile to the core so folding, wrinkling, and other movement cannot occur either during handling or after placement. Achieve bonding using nonwater-soluble adhesive, heat sealing, or another method recommended by the manufacturer. Do not use adhesive on areas of the geotextile fabric where flow is intended to occur.

If heat sealing is used, do not weaken the geotextile below the required strength values. Extend the geotextile below the bottom of the core far enough to completely encapsulate a the collector pipe.

(c) Geocomposite Pavement Edge Drains. Ensure that the geotextile tightly encapsulates the geocomposite edge drain, and that the edge drains permit inflow from both sides. Ensure that the drain core with the geotextile in place provides a minimum flow rate of 3 liters per second per meter of width when tested in accordance with ASTM D 4716 under the following test conditions:

(1) A specimen 300 mm long.

(2) An applied load of 69 kPa.

(3) A gradient of 0.1.

(4) A 100-hour seating period.

(5) A closed-cell foam rubber between platens and geocomposite.

If the geocomposite polymer core separates the flow channel into two or more parts, consider only the tested flow rate of the channel facing the pavement.

Firmly attach the geotextile to the core so folding, wrinkling, and other movement cannot occur during handling or after placement. Achieve bonding using nonwater-soluble adhesive, heat sealing, or another method recommended by the manufacturer. Do not use adhesive on areas of the geotextile fabric where flow is intended to occur.

If heat sealing is used, do not weaken the geotextile below the required strength values. Extend the geotextile below the bottom of the core far enough to completely encapsulate the collector pipe.

Furnish nonperforated plastic pipe conforming to Subsection 706.08 for all pipe and pipe fittings used for an outlet to the edge drain.

Furnish solvent cement for the outlet pipe and fittings in accordance with ASTM D 2564. Ensure that the material composition of the outlet fittings is compatible for direct solvent welding to PVC.

714.03 Geogrids

Furnish geogrids consisting of polymeric materials such as polypropylene, polyethylene, or polyester formed into a stable network of bars or straps fixed at their junctions such that the bars retain their relative position to each other. Ensure that the geogrid is treated to resist ultraviolet degradation, and that it conforms to the physical strength requirements shown in table 714-7 in accordance with ASTM D 4595.

Table 714-7.—Physical strength requirements for geogrids.

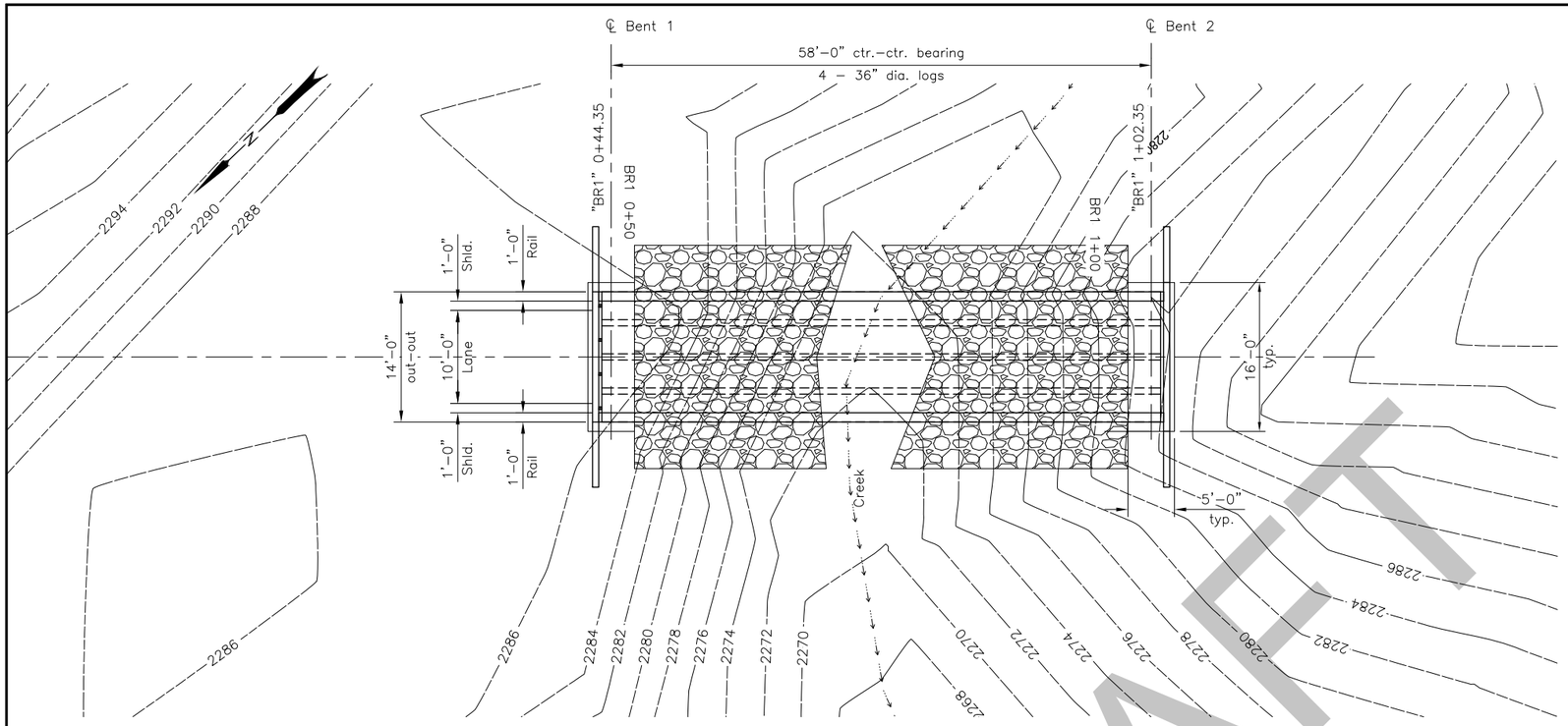
Category	Minimum Strength at 5% Strain (kN/m)	Minimum Ultimate Strength at Breakage (kN/m)
1	9	13
2	13	21
3	17	29
4	28	61
5	53	98
6	70	125

Furnish the CO with a certificate signed by a legally authorized official from the company that manufactured the geogrid. Ensure that the certificate attests that the geogrid meets the chemical, physical, material, and manufacturing requirements stated in the specification. When requested by the CO, furnish a sample of the geogrid from each lot for verification testing.

During shipment and storage, wrap the geogrid in a heavy-duty protective covering. Protect the geogrid from mud, soil, dust, debris, and sunlight prior to installation.

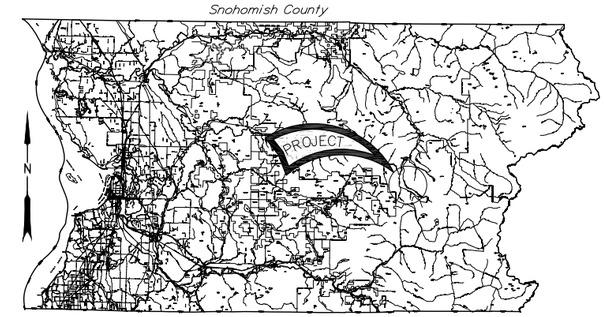
Ensure that the geogrid meets the minimum average roll values for the wide-width strip tensile strength tests performed in accordance with ASTM D 4595 for the category SHOWN ON THE DRAWINGS. Provide test results to the CO prior to incorporating the geogrid into the work.

Ensure that the aperture size for all geogrids is from 22 to 75 mm. Square and rectangular openings are permitted. Strengths shown in table 714-7 are for both the machine and cross directions.



BRIDGE SITE NO 1 – PLAN

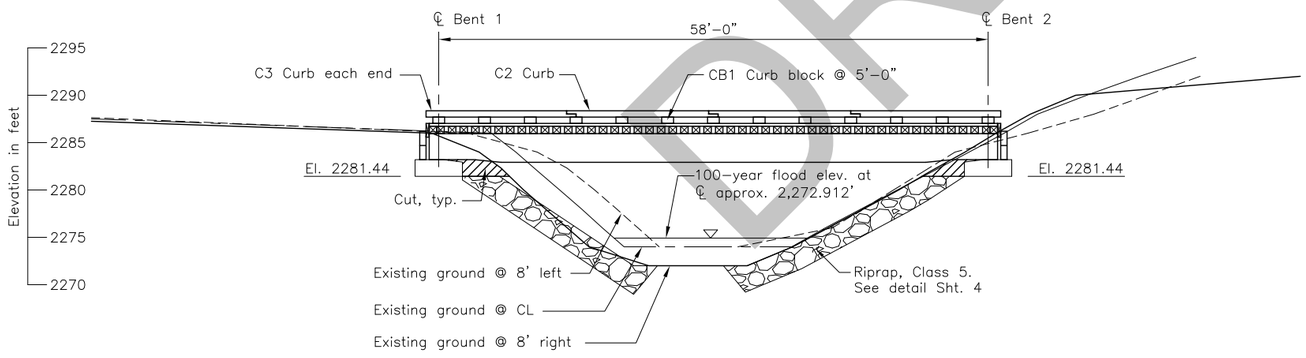
SCALE: ⅛"=1'-0"



SEC. 17, T29N, R11E, WM

VICINITY MAP

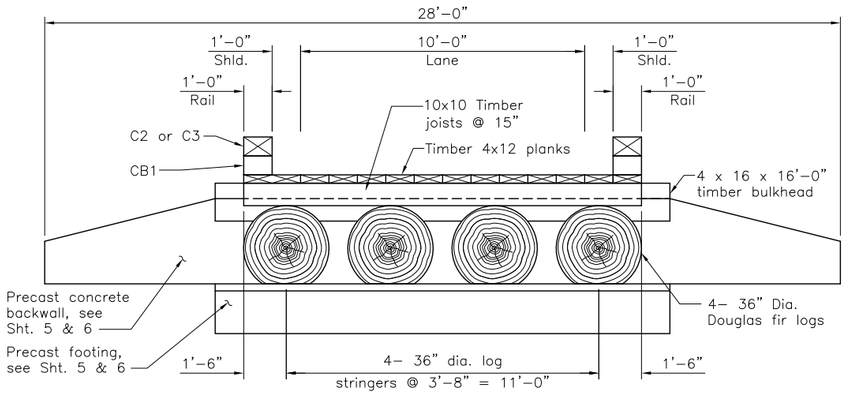
No Scale



BRIDGE SITE NO 1 – ELEVATION

SCALE: ⅛"=1'-0"

Note:
Elevations shown are based on North American Vertical Datum 1988 (NAVD88).



TYPICAL SECTION

SCALE: ⅜"=1'-0"

REV.	DESCRIPTION	APPROVED	DATE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
THE PACIFIC NORTHWEST REGION (R-6)

GARY E. RAYOR
STATE OF WASHINGTON
FIELD ENGINEER
22657
REGISTERED
PROFESSIONAL ENGINEER

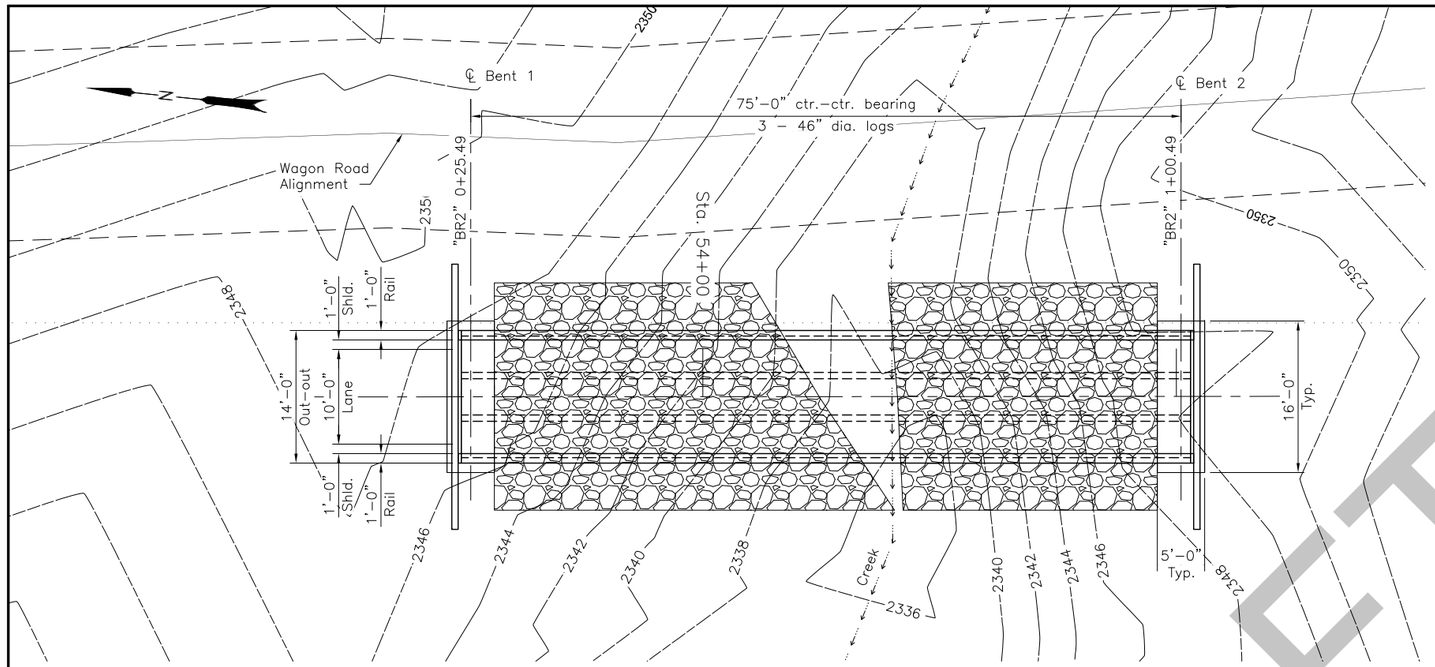
EXPIRES: 12/31/

MONTE CRISTO – 2013 ACCESS ROUTE LOG STRINGER BRIDGE AT STA. XX+XX PLAN & ELEVATION – BR. SITE NO. 1

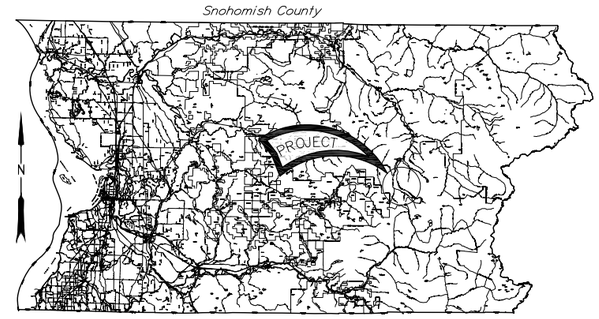
Forest: MT BAKER-SNOQUALMIE **Loading:** HS25
Bridge No.: MC XX+XX **Length:** unknown
Location: T29N, R11E, Sec. 17 **Width:** 14

Designed: MGM **Drawn:** JAT **Checked:** GER
Submitted: Date:
SUPERVISORY STRUCTURAL ENGINEER
Approved: Date:
REGIONAL BRIDGE ENGINEER

SHEET 1 of 6 | DWG.No. R34+00



BRIDGE SITE NO 2 – PLAN
SCALE: 1/8"=1'–0"



SEC. 17, T29N, R11E, WM
VICINITY MAP
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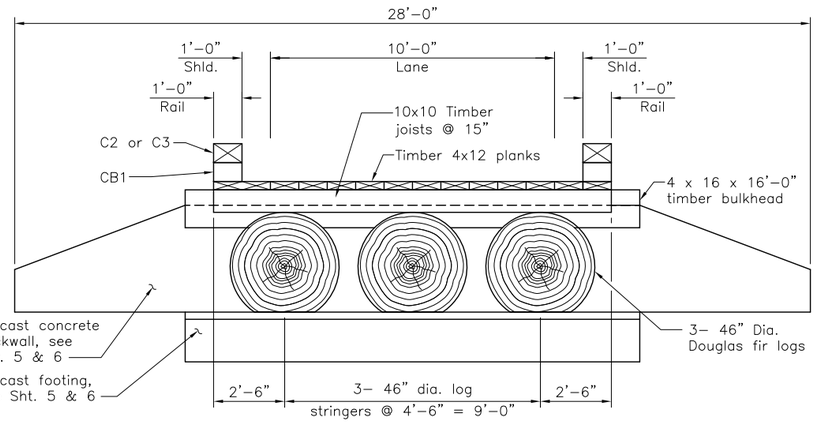

TYPICAL SECTION
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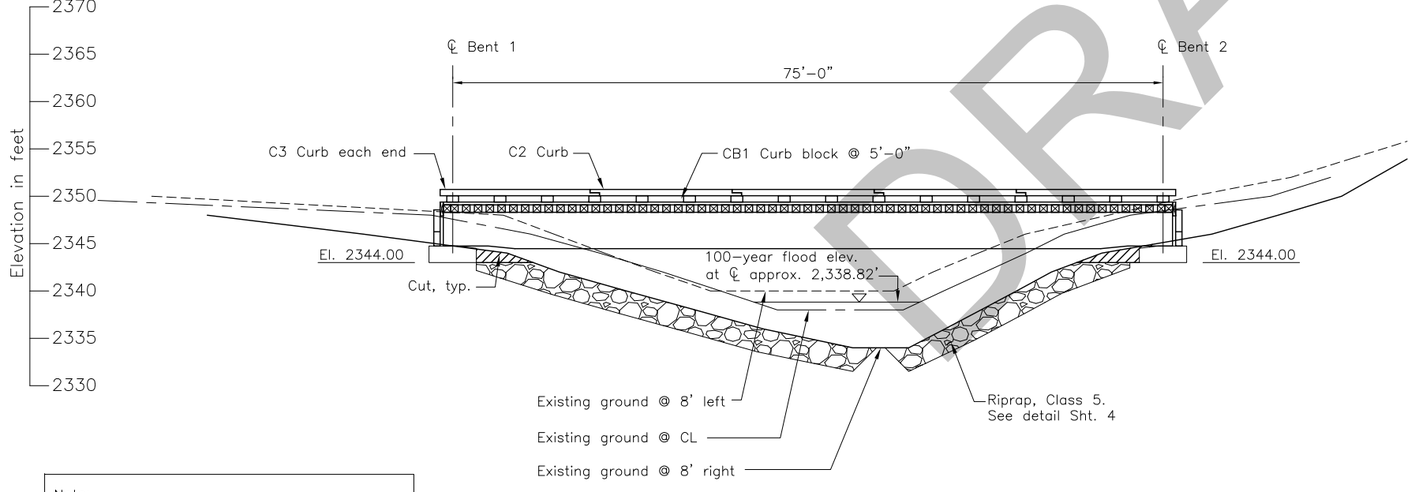


BRIDGE SITE NO 2 – ELEVATION
SCALE: 1/8"=1'–0"

Note:
Elevations shown are based on North American Vertical Datum 1988 (NAVD88).

REV.	DESCRIPTION	APPROVED	DATE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
THE PACIFIC NORTHWEST REGION (R–6)

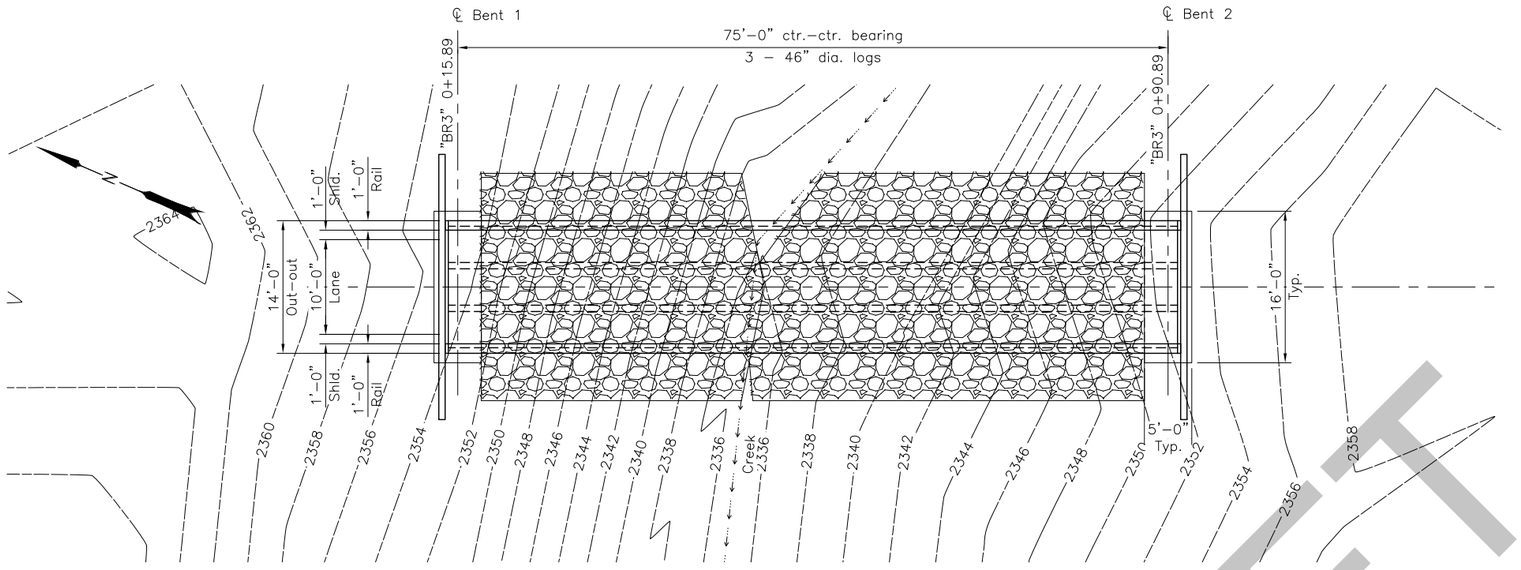
GARY E. RAYOR
STATE OF WASHINGTON
FIELD ENGINEER
22657
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 12/31/

MONTE CRISTO – 2013 ACCESS ROUTE LOG STRINGER BRIDGE AT STA. XX+XX PLAN & ELEVATION – BR. SITE NO. 2

Forest: MT BAKER–SNOQUALMIE **Loading:** HS25
Bridge No.: MC XX+XX **Length:** unknown
Location: T29N, R11E, Sec. 17 **Width:** 14

Designed: MGM **Drawn:** JAT **Checked:** GER
Submitted: **Date:**
SUPERVISORY STRUCTURAL ENGINEER
Approved: **Date:**
REGIONAL BRIDGE ENGINEER

SHEET 2 of 6 | DWG.No. R54+00



BRIDGE SITE NO 3 – PLAN
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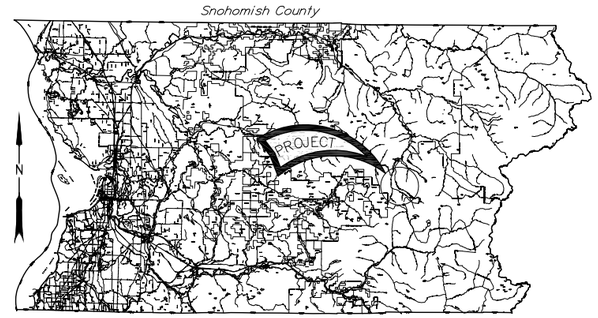

SEC. 17, T29N, R11E, WM
VICINITY MAP
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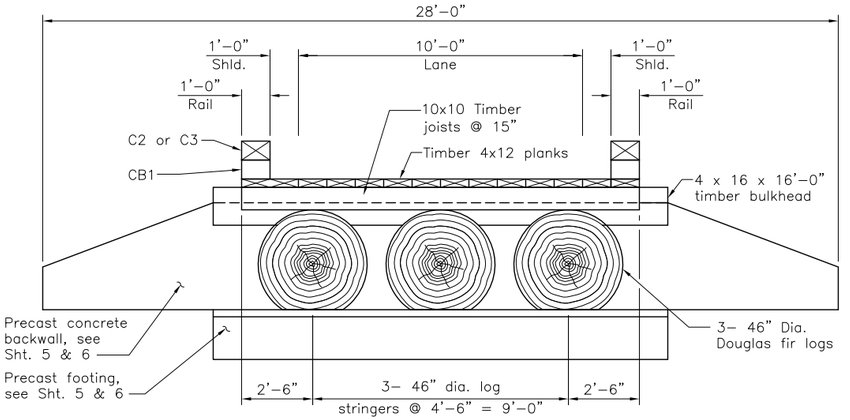
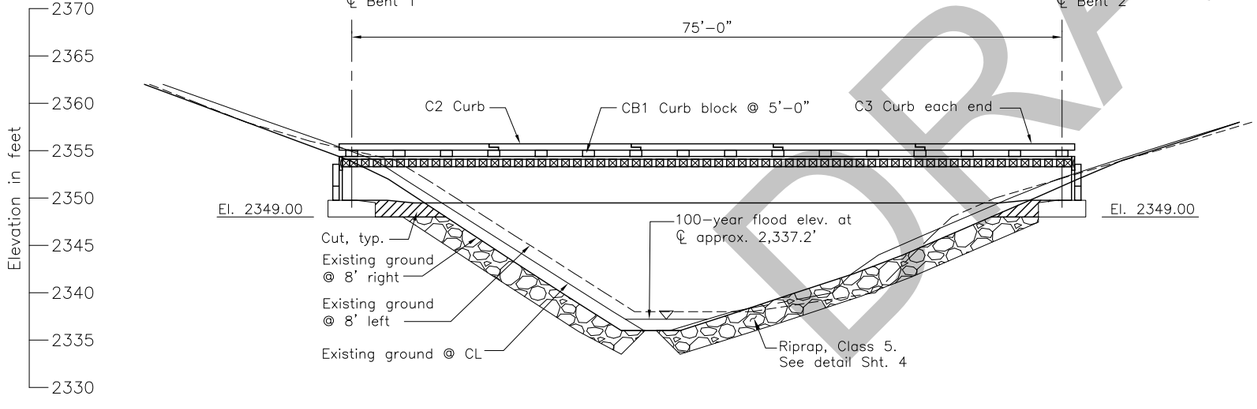


TYPICAL SECTION
SCALE: 3/8"=1'–0"



BRIDGE SITE NO 3 – ELEVATION
SCALE: 1/8"=1'–0'

Note:
Elevations shown are based on North American Vertical Datum 1988 (NAVD88).

REV.	DESCRIPTION	APPROVED	DATE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
THE PACIFIC NORTHWEST REGION (R–6)

GARY E. RAYOR
STATE OF WASHINGTON
FIELD ENGINEERING
22657
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: 03/21/

MONTE CRISTO – 2013 ACCESS ROUTE LOG STRINGER BRIDGE AT STA. XX+XX PLAN & ELEVATION – BR. SITE NO. 3

Forest: MT BAKER–SNOQUALMIE **Loading:** HS25
Bridge No.: MC XX+XX **Length:** unknown
Location: T29N, R11E, Sec. 17 **Width:** 14

Designed: MGM **Drawn:** JAT **Checked:** GER
Submitted: ..... **Date:** .....
SUPERVISORY STRUCTURAL ENGINEER
Approved: ..... **Date:** .....
REGIONAL BRIDGE ENGINEER

SHEET 3 of 6 | DWG.No. R67+62

GENERAL NOTES

Bridge designed to the following criteria:
Live Load – HS23 Truck and L39 Loader
Ground Snow Load – 200 PSF

Bridge design in accordance with AASHTO Standard Specifications for Highway Bridge, 17th Edition, with interims through 2002, unless otherwise noted or shown. Log stringer design based on uniform distribution of live load to logs and maximum allowable fiber stress of 1350 PSI.

Specifications – materials and construction of the bridges shall be in accordance with "Forest Service Specifications for Construction of Roads & Bridges", Department of Agriculture Forest Service, Washington Office, EM–7700–100, August 1996 Revised, unless otherwise noted or shown.

Timber superstructure – for superstructure details and specification, use details and specifications from standard Dwg. RS280, unless otherwise noted or shown.

Log stringers – per requirements of Std. Dwg. NO. RS280.

Deck planks, running planks, felloe curbs, joists and bulkheads – Alaska yellow cedar No. 1 Grade, Grading Rules agency WCLI, untreated.

Bridge steel hardware – Galvanized hardware shall meet the requirements of AASHTO M270, Grade 36, with nuts and bolts conforming to ASTM A307, Grade A.

Precast concrete footings and backwalls shall conform to Class A or A (AE) with 3500 PSI minimum compressive strength in 28 days.

Precast footing size based on a presumptive soil bearing stress of 2500 PSF based on the geotechnical report for this project.

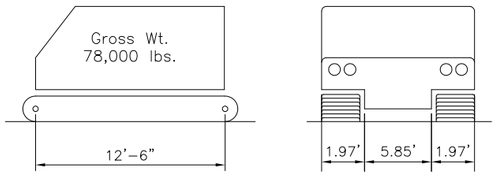
Precast concrete backwall size based on the following:
γ soil = 128 pcf
Ø soil = 28 deg.
2'–0" Liveload surcharge

All concrete inserts shall be hot–dip galvanized after fabrication.

Grease and cap all concrete inserts prior to shipping.

All structural steel shapes and plates shall conform to ASTM A36 and shall be hot–dip galvanized after fabrication.

Deformed reinforcing steel shall conform to AASHTO M31, M42 or M53, Grade 60.



L39 TRACK LOADER
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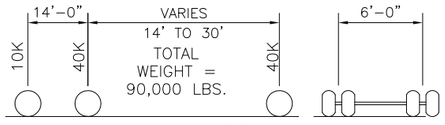

HS25

HS25 TRUCK
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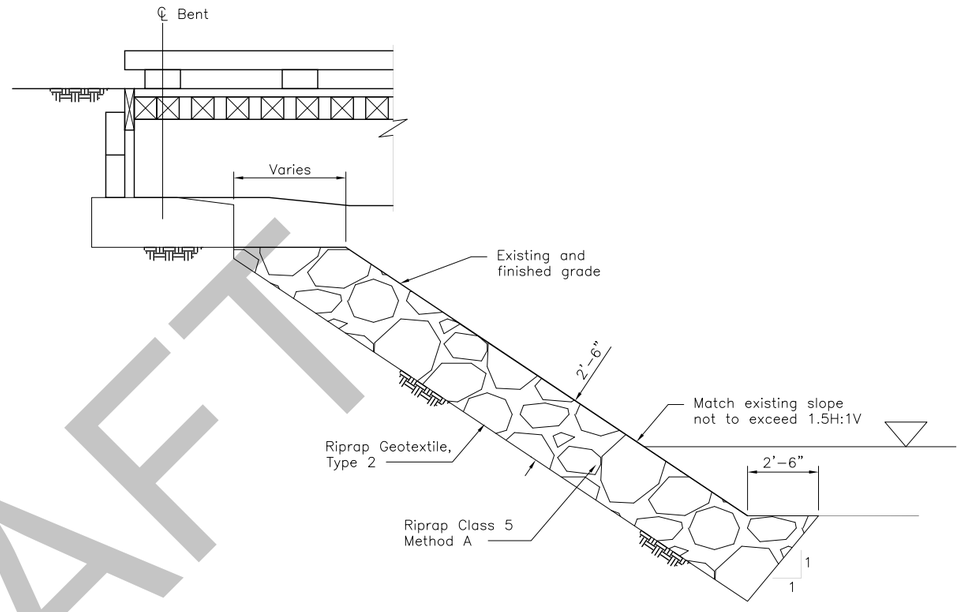


RIPRAP SLOPE PROTECTION INSTALLATION DETAIL
NO SCALE

REV.	DESCRIPTION	APPROVED	DATE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
THE PACIFIC NORTHWEST REGION (R–6)

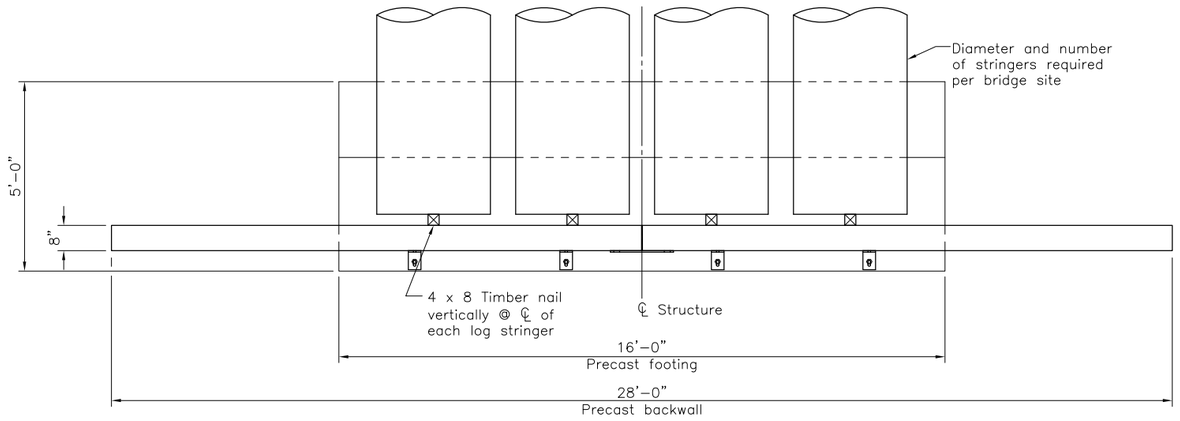
GARY E. RAYORY
STATE OF WASHINGTON
FIELD TEST
22657
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 12/31/

MONTE CRISTO – 2013 ACCESS ROUTE
LOG STRINGER BRIDGE
GENERAL NOTES

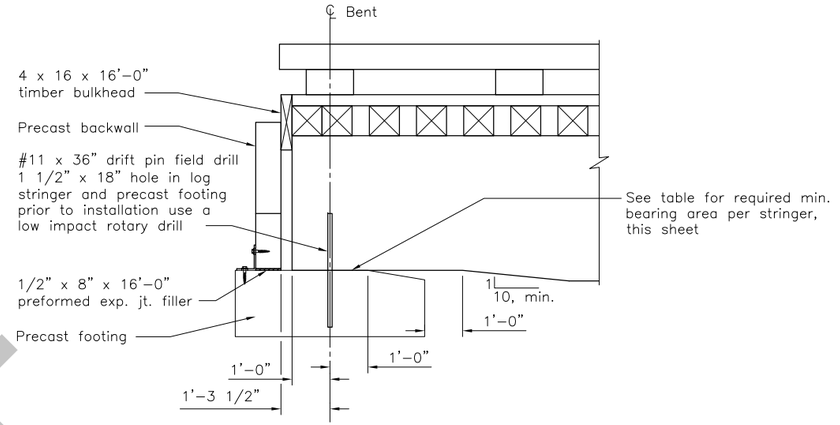
Forest: MT BAKER–SNOQUALMIE **Loading:** HS25
Bridge No.: – **Length:** unknown
Location: T29N, R11E, Sec. 17 **Width:** 14

Designed: MGM **Drawn:** JAT **Checked:** GER
Submitted: ..... **Date:** .....
SUPERVISORY STRUCTURAL ENGINEER
Approved: ..... **Date:** .....
REGIONAL BRIDGE ENGINEER

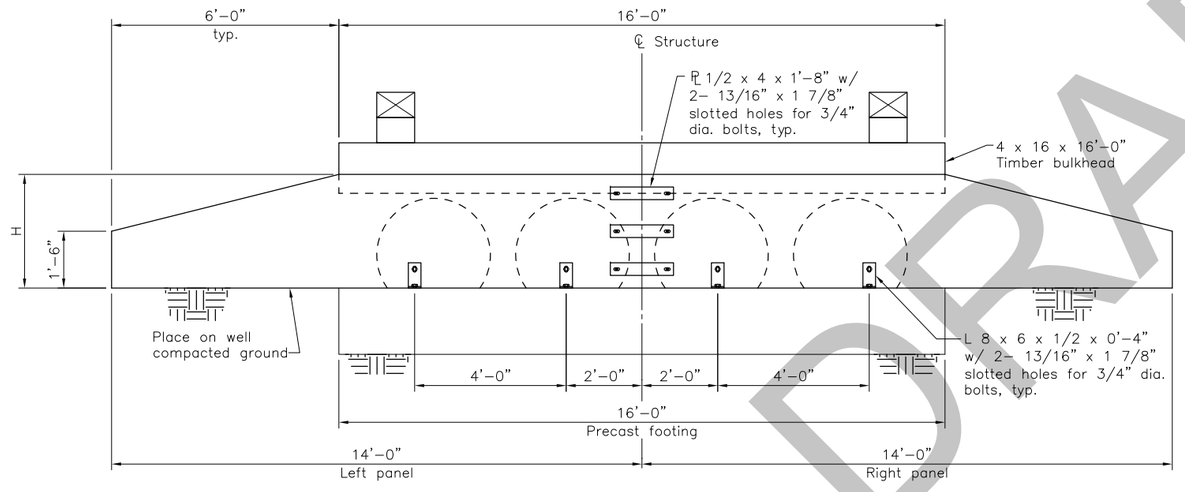
SHEET 4 of 6 | DWG.No. R–



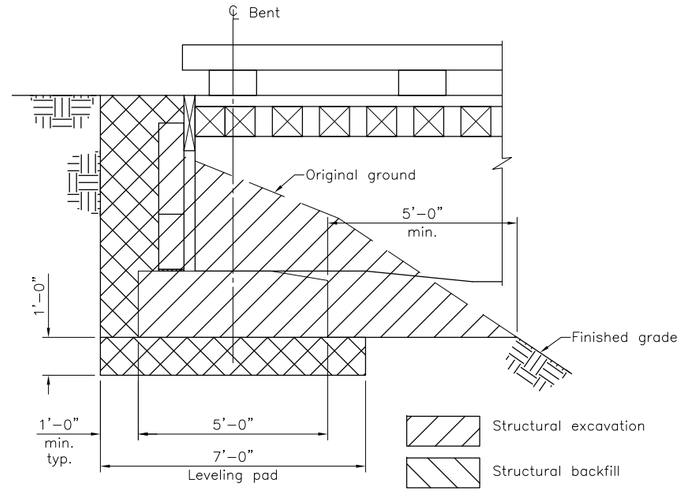
PLAN VIEW
SCALE: 1/2"=1'-0"



SECTION VIEW
SCALE: 1/2"=1'-0"



BENT ELEVATION
SCALE: 1/2"=1'-0"



EXCAVATION & BACKFILL PAY LIMITS
SCALE: 1/2"=1'-0"

Bridge Site No.	STA	Precast Backwall # Splices	Precast Backwall "H" ft.	Precast Backwall Lt. panel weight (kip)	Precast Backwall Rt. panel weight (kip)	Precast Footing Weight (kips)	Min. bearing area (in^2)
1	XX+XX	3	3.0	3.4	3.4	20.1	288
2	XX+XX	4	4.0	4.9	4.9	20.1	360
3	XX+XX	4	4.0	4.9	4.9	20.1	360

Contractor is responsible to determine picking procedure and provide all necessary lifting eyes as required.

GARY E. RAYOR — STATE OF WASHINGTON — FIELDER — 22657 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 12/31/

REV.	DESCRIPTION	APPROVED	DATE

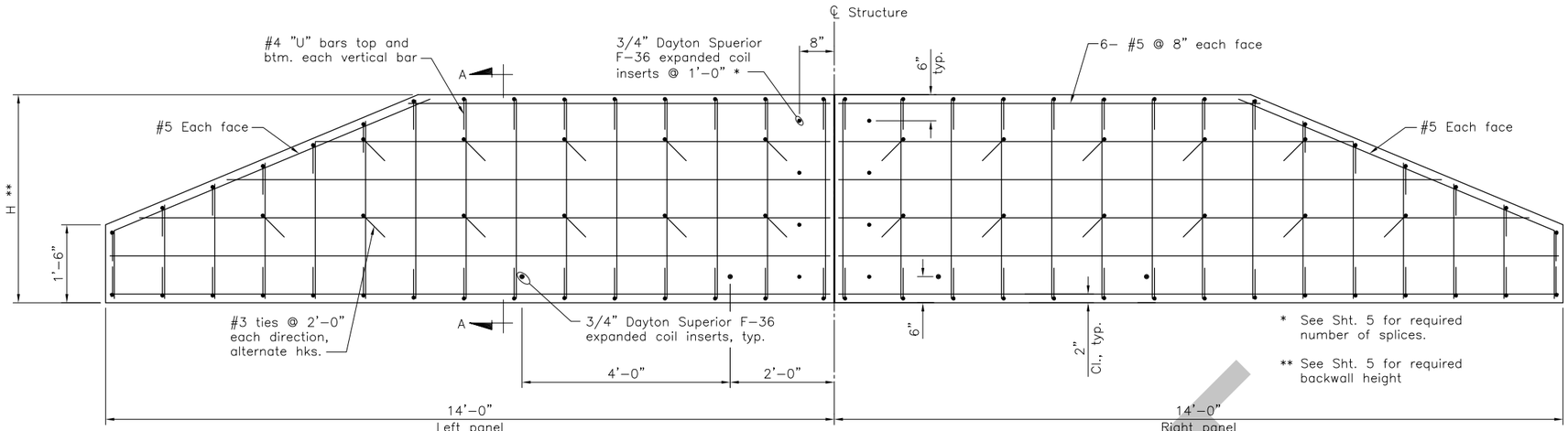
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
THE PACIFIC NORTHWEST REGION (R-6)

MONTE CRISTO – 2013 ACCESS ROUTE LOG STRINGER BRIDGE BENT AND BACKWALL DETAILS

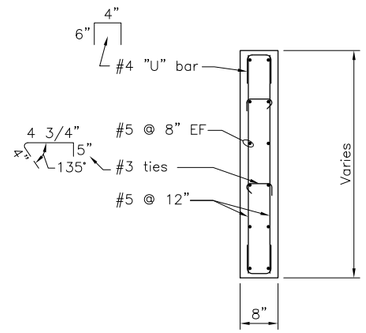
Forest: MT BAKER-SNOQUALMIE **Loading:** HS25
Bridge No.: – **Length:** unknown
Location: T29N, R11E, Sec. 17 **Width:** 14

Designed: MGM **Drawn:** JAT **Checked:** GER
Submitted: **Date:**
SUPERVISORY STRUCTURAL ENGINEER
Approved: **Date:**
REGIONAL BRIDGE ENGINEER

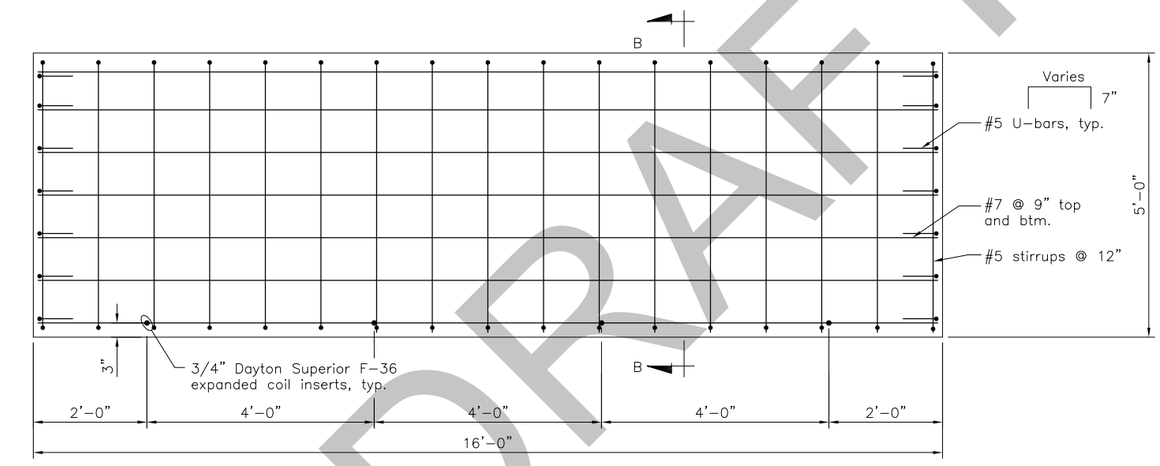
SHEET 5 of 6 | DWG.No. R-



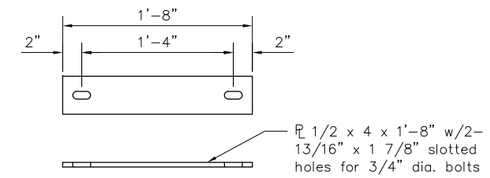
PRECAST BACKWALL REINFORCEMENT DETAIL
SCALE: 3/4"=1'–0"



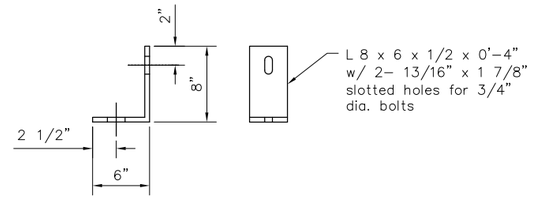
SECTION A–A
SCALE: 3/4"=1'–0"



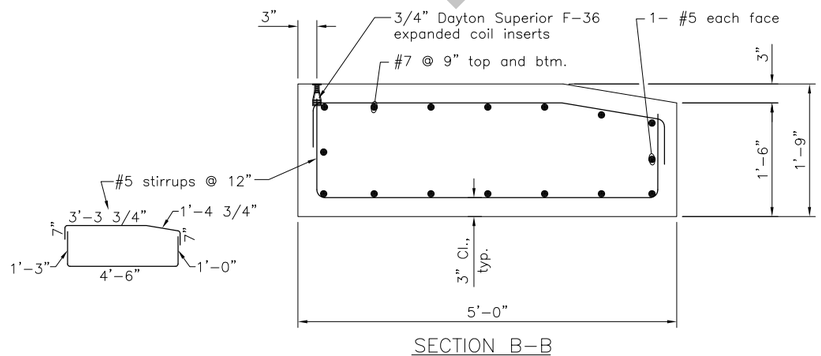
PRECAST FOOTING REINFORCEMENT DETAIL
SCALE: 3/4"=1'–0"



SPLICE PLATE DETAIL
SCALE: 1 1/2"=1'–0"



ANGLE DETAIL
SCALE: 1 1/2"=1'–0"



SECTION B–B
SCALE: 3/4"=1'–0"

REV.	DESCRIPTION	APPROVED	DATE

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
THE PACIFIC NORTHWEST REGION (R–6)

GARY E. RAYOR
STATE OF WASHINGTON
FIELD ERIN
22657
REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 12/31/

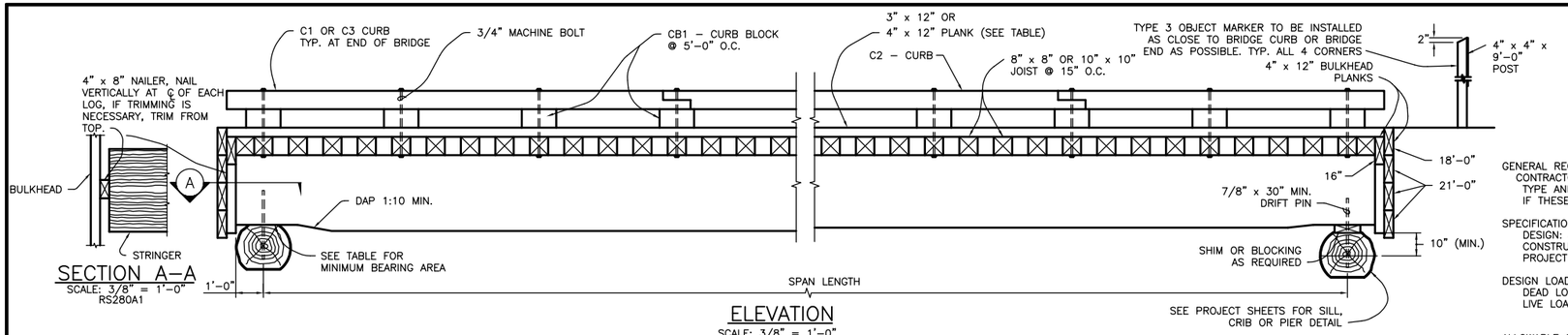
MONTE CRISTO – 2013 ACCESS ROUTE
LOG STRINGER BRIDGE
BACKWALL & FOOTING DETAILS

Forest: MT BAKER–SNOQUALMIE **Loading:** HS25
Bridge No.: – **Length:** unknown
Location: T29N, R11E, Sec. 17 **Width:** 14

Designed: MGM **Drawn:** JAT **Checked:** GER
Submitted: **Date:**
SUPERVISORY STRUCTURAL ENGINEER
Approved: **Date:**
REGIONAL BRIDGE ENGINEER

SHEET 6 of 6 DWG.No. R–

Dwg. of



SECTION A–A
SCALE: 3/8" = 1'–0"
RS280A1

ELEVATION
SCALE: 3/8" = 1'–0"
RS280B1

4 LOG STRINGERS

SPAN (C–C OF BRGS)	STRINGER		MIN. BEARING AREA	DECK * 4" x 12" FLOOR PLANK		10" x 10" 16'–0" JOISTS	8" x 12" CURBS C1	C2	C3	CB–1 CURB BLOCKS	4" x 12" BULKHEAD PLANKS 6'–0"	18'–0"	21'–0"	4" x 8" NAILING STRIP		TOTAL TIMBER	3/4" x 32" M.B. CURB TO DECK	1/2" x 16" DRIFT PIN	7/8" x 30" DRIFT PIN	3/4" WASH ERS
FT.	LENGTH	DIA.	IN^2	LENGTH	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	LENGTH	NO.	MBM	NO.	NO.	NO.	NO.
20	22'–0"	23	195	22'–8"	16	19	4	0	0	10	2	2	4	1'–6"	8	5.10	10	76	8	20
25	27'–0"	25	205	27'–8"	16	23	2	0	2	12	2	2	6	2'–6"	8	6.25	12	92	8	24
30	32'–0"	27	215	32'–8"	16	27	0	0	4	14	2	2	6	2'–6"	8	7.20	14	108	8	28
35	37'–0"	29	235	37'–8"	16	31	4	2	0	16	2	2	6	2'–6"	8	8.17	16	124	8	32
40	42'–0"	31	250	42'–8"	16	35	2	2	2	18	2	2	6	2'–6"	8	9.12	18	140	8	36
45	47'–0"	33	265	47'–8"	16	39	0	2	4	20	2	2	6	2'–6"	8	10.07	20	156	8	40
50	52'–0"	35	275	52'–8"	16	43	4	4	0	22	2	2	6	2'–6"	8	11.03	22	172	8	44
55	57'–0"	37	290	57'–8"	16	47	2	4	2	24	2	2	8	3'–6"	8	12.17	24	188	8	48
60	62'–0"	39	305	62'–8"	16	51	0	4	4	26	2	2	8	3'–6"	8	13.14	26	204	8	52
65	67'–0"	41	315	67'–8"	16	55	4	6	0	28	2	2	8	3'–6"	8	14.11	28	220	8	56
70	72'–0"	42	330	72'–8"	16	59	2	6	2	30	2	2	8	3'–6"	8	15.06	30	236	8	60
75	77'–0"	44	340	77'–8"	16	63	0	6	4	32	2	2	8	3'–6"	8	16.02	32	252	8	64
80	82'–0"	46	355	82'–8"	16	67	4	8	0	34	2	2	8	3'–6"	8	16.99	34	268	8	68

* 3" x 12" PLANKS ON 10" x 10" JOISTS MAY BE USED IF SPACING OF LOG STRINGERS IS HELD TO A MAXIMUM OF 3'–8".

5 LOG STRINGERS

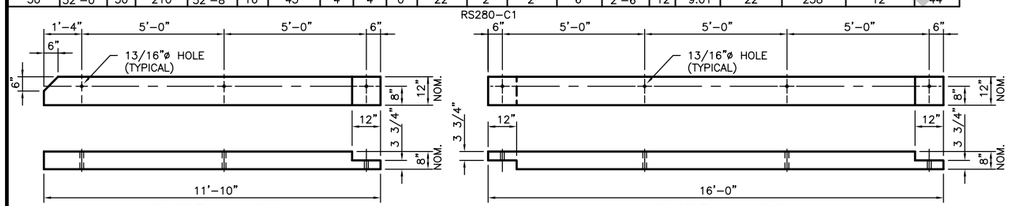
SPAN (C–C OF BRGS)	STRINGER		MIN. BEARING AREA	DECK ** 3" x 12" FLOOR PLANK		10" x 10" 16'–0" JOISTS	8" x 12" CURBS C1	C2	C3	CB–1 CURB BLOCKS	4" x 12" BULKHEAD PLANKS 6'–0"	18'–0"	21'–0"	4" x 8" NAILING STRIP		TOTAL TIMBER	3/4" x 32" M.B. CURB TO DECK	1/2" x 16" DRIFT PIN	7/8" x 30" DRIFT PIN	3/4" WASH ERS
FT.	LENGTH	DIA.	IN^2	LENGTH	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	LENGTH	NO.	MBM	NO.	NO.	NO.	NO.
20	22'–0"	21	175	22'–8"	16	19	4	0	0	10	2	2	4	1'–6"	10	4.75	10	95	10	20
25	27'–0"	23	185	27'–8"	16	23	2	0	2	12	2	2	4	1'–6"	10	5.62	12	115	10	24
30	32'–0"	25	190	32'–8"	16	27	0	0	4	14	2	2	6	2'–6"	10	6.69	14	135	10	28
35	37'–0"	27	205	37'–8"	16	31	4	2	0	16	2	2	6	2'–6"	10	7.58	16	155	10	32
40	42'–0"	29	215	42'–8"	16	35	2	2	2	18	2	2	6	2'–6"	10	8.45	18	175	10	36
45	47'–0"	31	230	47'–8"	16	39	0	2	4	20	2	2	6	2'–6"	10	9.33	20	195	10	40
50	52'–0"	33	240	52'–8"	16	43	4	4	0	22	2	2	6	2'–6"	10	10.21	22	215	10	44
55	57'–0"	34	250	57'–8"	16	47	2	4	2	24	2	2	6	2'–6"	10	11.09	24	235	10	48
60	62'–0"	36	260	62'–8"	16	51	0	4	4	26	2	2	6	2'–6"	10	11.96	26	255	10	52

** 4" x 12" PLANKS ON 8" x 8" JOISTS MAY BE USED IF SPACING OF LOG STRINGERS IS HELD TO A MAXIMUM OF 3'–0".

6 LOG STRINGERS

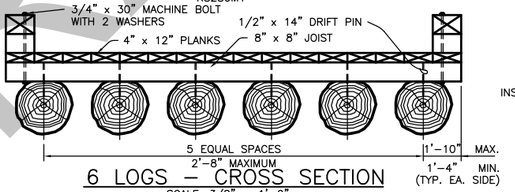
SPAN (C–C OF BRGS)	STRINGER		MIN. BEARING AREA	DECK 4" x 12" FLOOR PLANK		10" x 10" 16'–0" JOISTS	8" x 12" CURBS C1	C2	C3	CB–1 CURB BLOCKS	4" x 12" BULKHEAD PLANKS 6'–0"	18'–0"	21'–0"	4" x 8" NAILING STRIP		TOTAL TIMBER	3/4" x 32" M.B. CURB TO DECK	1/2" x 16" DRIFT PIN	7/8" x 30" DRIFT PIN	3/4" WASH ERS
FT.	LENGTH	DIA.	IN^2	LENGTH	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	LENGTH	NO.	MBM	NO.	NO.	NO.	NO.
20	22'–0"	19	165	22'–8"	16	19	4	0	0	10	2	2	4	1'–6"	12	4.21	10	114	12	20
25	27'–0"	21	170	27'–8"	16	23	2	0	2	12	2	2	4	1'–6"	12	4.97	12	138	12	24
30	32'–0"	23	175	32'–8"	16	27	0	0	4	14	2	2	4	1'–6"	12	5.73	14	162	12	28
35	37'–0"	25	185	37'–8"	16	31	4	2	0	16	2	2	6	2'–6"	12	6.71	16	186	12	32
40	42'–0"	27	195	42'–8"	16	35	2	2	2	18	2	2	6	2'–6"	12	7.47	18	210	12	36
45	47'–0"	28	205	47'–8"	16	39	0	2	4	20	2	2	6	2'–6"	12	8.23	20	234	12	40
50	52'–0"	30	210	52'–8"	16	43	4	4	0	22	2	2	6	2'–6"	12	9.01	22	258	12	44

RS280–C1



4 LOGS – CROSS SECTION
TYPICAL EXCEPT WHERE NOTED
SCALE: 3/8" = 1'–0"
RS280L1

5 LOGS – CROSS SECTION
SCALE: 3/8" = 1'–0"
RS280M1



6 LOGS – CROSS SECTION
SCALE: 3/8" = 1'–0"
RS280N1

GENERAL NOTES

GENERAL REQUIREMENTS:
CONTRACTOR SHALL CHECK THE GENERAL LAYOUT SHEET TO DETERMINE THE SPAN LENGTH, NUMBER AND SOURCE OF STRINGERS, ABUTMENT TYPE AND OTHER GENERAL REQUIREMENTS. THIS STANDARD IS BASED ON STRENGTH PROPERTIES OF DOUGLAS FIR OR WESTERN LARCH LOGS. IF THESE SPECIES ARE NOT AVAILABLE, THE CONTRACTOR SHALL CONTACT THE ENGINEER FOR AN ADJUSTED MINIMUM LOG DIAMETER.

SPECIFICATIONS:
DESIGN: AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 1998.
CONSTRUCTION: FOREST SERVICE STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES 1985 AND APPLICABLE SPECIAL PROJECT SPECIFICATIONS.

DESIGN LOADS:
DEAD LOAD: TIMBER, 50 LBS/CUBIC FT.
LIVE LOAD: HS25 (125% OF HS20) AT STANDARD ALLOWABLE STRESSES.

ALLOWABLE STRESSES: ADJUSTED FOR WET CONDITIONS, POUNDS PER SQUARE INCH

	BENDING, Fb	SHEAR, Fv	COMPRESSION PERP. TO GRAIN, Fc
LOGS	2100	125	250

QUANTITIES:
LUMBER AND HARDWARE QUANTITIES ARE ESTIMATES. LUMBER ESTIMATE IS BASE UPON NOMINAL SIZE AND FINISHED LENGTH. A SUITABLE INCREASE IN ESTIMATED AMOUNTS SHOULD BE MADE TO COVER SHOP REQUIREMENTS AND FIELD LOSSES.

MATERIALS:
LUMBER:
SAWN LUMBER SHALL BE DOUGLAS FIR (COAST TYPE IF TO BE TREATED) OR WESTERN LARCH, ROUGH SAWN OR S4S, NO. 1 GRADE OR BETTER ACCORDING TO THE CURRENT GRADING RULES OF WESTERN WOOD PRODUCTS ASSOCIATION OR THE WEST COAST LUMBER INSPECTION BUREAU.

STRINGERS:
LOGS SHALL BE DOUGLAS FIR OR WESTERN LARCH, CUT FROM LIVE TREES FREE FROM DECAY, INSECT ATTACK OR VISIBLE CRACKS, PEELED AND TRIMMED SMOOTH OF ALL KNOTS AND PROJECTIONS. NO LARGE KNOTS SHALL BE ALLOWED IN THE MIDDLE THIRD OF THE SPAN. EACH STRINGER SHALL BE OF THE MINIMUM MIDSPAN DIAMETERS TABULATED. ONE HALF OF THE SAPWOOD IS TO BE DEDUCTED IN MEASURING THE DIAMETER. THE MAXIMUM ALLOWABLE VARIATION IN STRINGER DIAMETER SHALL NOT EXCEED 15% OF THE MIDSPAN DIAMETER OF THE SMALLEST STRINGER.

HARDWARE:
MACHINE BOLTS AND DRIFT PINS SHALL BE OF THE SIZE AND TYPE SHOWN AND SHALL CONFORM TO ASTM A–307. DRIFT PINS SHALL HAVE THEIR ENDS SLIGHTLY TAPERED OR ROUNDED. APPROPRIATE SIZE MALLEABLE IRON WASHERS SHALL BE USED UNDER BOLT HEADS AND NUTS.

FABRICATION:
NO SHOP DRAWINGS ARE REQUIRED. SUPERSTRUCTURE LUMBER AND TIMBER SHALL BE AS DETAILED ON THIS SHEET. ALL LUMBER AND TIMBER SHALL BE COMPLETELY AND ACCURATELY FABRICATED BEFORE TREATMENT. INSPECTION MARKINGS ARE REQUIRED AS CALLED FOR BELOW. BOLT HOLES SHALL BE BORED TO 1/16 INCH OVERSIZE. HOLES FOR DRIFT PINS SHALL BE 1/16 INCH UNDERSIZE.

TREATMENT:
BULKHEAD PLANKS, STRINGER SHIMS OR BLOCKS, AND NAILERS SHALL BE TREATED. ALL REMAINING LUMBER AND TIMBER SHALL BE TREATED AS INDICATED ON THE GENERAL LAYOUT SHEET. AFTER FABRICATION, ALL LUMBER AND TIMBER TO BE TREATED SHALL BE INCISED (MEMBERS TOO LARGE FOR MACHINE INCISING SHALL BE MANUALLY INCISED), AND SHALL BE PRESSURE TREATED IN ACCORDANCE WITH AWPA C–14, USING ANY ONE OF THE FOLLOWING TREATMENTS, (1) COPPER NAPHTHENATE MEETING AWPA P–8, USING AN AWPA P–9 TYPE "A" SOLVENT TO A RETENTION OF 0.075 PCF OF COPPER; (2) PENTACHLOROPHENOL MEETING AWPA P–8, USING AN AWPA P9 TYPE "A" SOLVENT, TO A RETENTION OF 0.6 PCF; (3) CREOSOTE MEETING AWPA P–1, TO A RETENTION OF 12 PCF.

INSPECTION AND CERTIFICATIONS:
ONE COPY OF THE FOLLOWING COMPLIANCE CERTIFICATES SHALL BE FURNISHED UPON DELIVERY OF SAWN MATERIAL TO THE JOB SITE: (A) SUPPLIER CERTIFICATIONS THAT ALL WOOD MATERIALS MEET THE REQUIREMENTS AS TO SPECIES AND GRADES: (B) CERTIFICATION OF PRESERVATIVE, PENETRATION IN INCHES AND RETENTION IN POUNDS PER CUBIC FOOT (ASSAY METHOD) BY AN ALSC QUALIFIED TESTING AND INSPECTION AGENCY.

FIELD TREATMENT:
LOGS: AFTER ALL TRIMMING, HEWING OR NOTCHING OF LOGS IS COMPLETED, THE BUT ENDS AND THE BOTTOM HALF OF THE PERIMETER, 3 FEET FROM EACH END OF THE STRINGER LOGS SHALL BE TREATED WITH THREE BRUSH COATS OF COPPER NAPHTHENATE PRESERVATIVE MEETING AWPA P–8, USING AN AWPA P9 TYPE "A" SOLVENT.

SAWN TIMBER: ALL CUTS, ABRASIONS AND DAPS MADE IN TREATED WOOD SHALL BE TREATED WITH THREE BRUSH COATS OF THE SAME COPPER NAPHTHENATE PRESERVATIVE USED ABOVE FOR LOGS. HOLES DRILLED IN THE FIELD SHALL BE POURED FULL OF THIS SAME PRESERVATIVE. UNUSED HOLES SHALL BE POURED FULL OF PRESERVATIVE AND PLUGGED WITH TIGHT–FITTING, TREATED PLUGS.

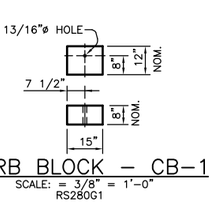
INSTALLATION OF FLOOR PLANKING:
FLOOR PLANKS SHALL BE RANDOM LENGTHS (8 FOOT MINIMUM). THEY SHALL BE BUTT JOINTED OVER THE JOISTS WITH NO BUTT JOINT ON THE SAME JOIST NEARER THAN EVERY THIRD LINE OF PLANK. LAY PLANK HEART SIDE DOWN. PLANKS SHALL BE SECURELY SPIKED WITH 3/8" X 8 1/2" COMMON SPIKES THROUGH 1/4" PREDRILLED HOLES. TWO SPIKES SHALL BE USED AT EACH END OF EACH PLANK WITH ONE SPIKE TO EACH JOIST ON ALTERNATE EDGES OF THE PLANK (15" CENTERS) BETWEEN ENDS.

RS280R1

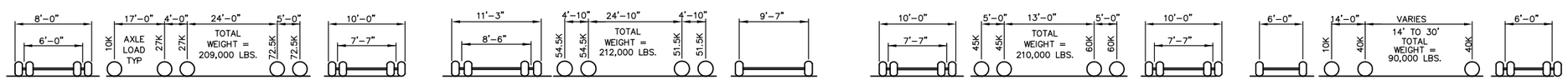
CURB – C1
SCALE: 3/8" = 1'–0"
RS280D1

CURB – C2
SCALE: 3/8" = 1'–0"
RS280E1

CURB – C3
SCALE: 3/8" = 1'–0"
RS280F1



CURB BLOCK – CB–1
SCALE: = 3/8" = 1'–0"
RS280G1



SKAGIT BU–101 YARDER AND T–110 TOWER

WASHINGTON 217D YARDER AND 110 SPAR

SKAGIT BU–99 YARDER AND T–110 TOWER

HS25

HS25 & MOBILE SPARS
RS280H1

DO NOT SCALE DRAWING

REV.	DESCRIPTION	APPROVED	DATE
2	UPDATED NOTES		
1	UPDATED AND PUT ON CAD	W.D.Mc.	8/91

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
THE PACIFIC NORTHWEST REGION (R–6)

STANDARD LOG STRINGER BRIDGE SUPERSTRUCTURE

Forest:
Bridge No.:
Location:
Loading: HS25 & SPARS
Length:
Width:

Designed: AQ & KM **Drawn:** L.McNEAL **Checked:**
Submitted: /S/ R.E. SCHMIDT . . . . . **Date:** 10/05/81. . .
SUPERVISORY STRUCTURAL ENGINEER
Approved: /S/ W. J. GRABNER . . . . . **Date:** 10/05/81. . .
REGIONAL BRIDGE ENGINEER

SHEET 1 of 1 | **DWG.No. RS280**