

Engineering Geologic Risk Assessment

Middle May Timber Sale

January 3, 2020



Prepared for:

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Department of Natural Resources
Northwest Region



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1/3/2020

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1.0 Introduction

The proposed Middle May timber harvest is divided into three units within Department of Natural Resources (DNR) Reiter Foothills Forest (Figure 1). Parts of this proposal, including three of the proposed bridges, were included with the Singletary Forest Practices Application (FPA) #2813860. The DNR obtained a Shoreline permit (15-114333 SHOR) through Snohomish County to install Bridge 1 over May Creek. Bridges 2, 3, 4, and 5 are regulated under Forest Practices and Washington Department of Fish and Wildlife jurisdictions.

Washington's Forest Practices rules define potentially unstable landforms, commonly referred to as rule-identified landforms (RIL)¹, for purposes of classifying and reviewing forest practice applications and regulating in those areas. The right stream bank at Bridge 5 meets the definition of inner gorge slopes as described in the Washington Forest Practices Board Manual, Section 16² (Figures 2 and 3).

At our request, Josh Hardesty (Forest Practices Geologist) and Steven Huang (Forest Practices Forester) performed a pre-application field review of Bridges 2, 3, and 5. They concurred with my interpretation that the right bank at Bridge 5 is an inner gorge, and Bridges 2 and 3 do not have inner gorge topography (ICN #135622). Topography at Bridge 4 is low-relief and not an inner gorge. The inner gorge at Bridge 5 is the focus of this report. This report is intended to satisfy the requirements of a Class-IV-Special FPA. All other RILs have been bound out of the proposed sale. Refer to the road plan for road and bridge construction details.

2.0 Scope of Services

The scope of services included:

- Review of DNR GIS data including:
 - Digital orthophotographs from the 1990s, 2002, 2006, 2009, 2011, 2013, 2015, 2017.
 - Light detection and ranging (LiDAR) data.
 - 1:100,000-scale geologic map (Figure 4).³
 - Forest Practices Landslide Inventory (LSI) mapping is not available for the area.
 - Forest Practices Landslide Hazard Zonation mapping is not available for the area.
- Review of available historical aerial photographs from 1942, 1954, 1957, 1969 (1 photo), 1974, 1975, 1978, 1983.
- Review of the engineering geologic letter report prepared for the Singletary Timber

¹ WAC 222-16-050 (1)(d)(i)

² Washington Forest Practices Board Manual, 2016, Section 16, Guidelines for evaluating potentially unstable slopes and landforms, Washington Department of Natural Resources, Olympia, Washington.

³ Tabor, R.W., Frizzell, V.A., Booth, D.B., Waitt, R.B., Whetten, J.T., and Zartman, R.E, 1993, Geologic map of the Skykomish River 30- by 60-minute quadrangle, Washington, U.S. Geological Survey, miscellaneous investigations series map I-1963, U.S. Department of the Interior.

Sale.⁴

- Field reconnaissance on September 4, 2019 by Jennifer Parker (LEG, QE), Amy Halgren (Forest Engineer), and Tyson Whiteid (Forester).
- Field reconnaissance on September 24, 2019 by Jennifer Parker and Tyson Whiteid.
- Pre-application Forest Practices field review on October 25, 2019 by Josh Hardesty (Forest Practices Geologist), Steve Huang (Forest Practices Forester), Jennifer Parker, Tyson Whiteid, Amy Halgren, and John Moon (Unit Forester).
- Pre-application Forest Practices field review on November 20, 2019 by Josh Hardesty, Steve Huang, Jennifer Parker, Tyson Whiteid, Derek Marks and Neil Shea (Tulalip Tribe).
- Preparation of this report.

Jennifer Parker (LEG #2892) is a “qualified expert” for timberland slope stability evaluation, as designated by the DNR.

3.0 Geologic Setting

The published 1:100,000-scale geologic map⁵ for the area indicates that the proposed sale is underlain by western mélangé belt marine metasedimentary rocks (KJmm(wk), KJmm(w)) (Figure 4). I observed fine grained metamorphic rocks exposed in the stream channel and right bank at the proposed Bridge 5 location.

4.0 Inner Gorge Crossing – Bridge 5

The Forest Practices Board Manual, Section 16⁶ describes inner gorges as canyons created by stream incision and mass movement. They are steeper than 70% and are a minimum 10 vertical feet in height. Stream A’s right bank at Bridge 5 has topography that fits the inner gorge definition (Table 1). The stream is in a natural, bedrock-lined channel. There is an approximately 6-foot tall waterfall within the right of way, but upstream of the bridge. The left bank is steep and vegetated (Table 4; Photograph 1).

Stream A initiates from a wetland and flows across a bedrock knob. I did not observe evidence of debris flows within this channel in the aerial imagery or evidence of debris flow deposits in the stream reaches reviewed in the field (Figures 5 through 11).

⁴ McKenzie, John, 2014, Engineering geologic letter report, proposed haul road stream crossing/bridge replacement, May Creek, Singletary Timber Sale: Department of Natural Resources, 10 p.

⁵ Tabor, R.W., Frizzell, V.A., Booth, D.B., Waitt, R.B., Whetten, J.T., and Zartman, R.E, 1993, Geologic map of the Skykomish River 30- by 60-minute quadrangle, Washington, U.S. Geological Survey, miscellaneous investigations series map I-1963, U.S. Department of the Interior.

⁶ Washington Forest Practices Board Manual, 2016, Section 16, Guidelines for evaluating potentially unstable slopes and landforms, Washington Department of Natural Resources, Olympia, Washington.



Photograph 1: View looks upstream at the proposed Bridge 5 crossing. Bedrock is visible in the stream channel.

Table 1: Channel geometry at proposed Bridge 5.

Stream bank (looking downstream)	Approximate Slope Angle	Approximate Slope Height	Substrate
Right Bank at proposed bridge	100% to vertical	13 feet	Vegetated bedrock slope
Left Bank at proposed bridge	Stepped, variable slope	4 feet	Vegetated, forest duff. Did not observe bedrock in the left bank.

A 50-foot steel modular bridge is planned at this location. Fill will not be placed within the channel. The inner gorge slope is expected to be bedrock because it is exposed in the lower approximately 4 feet of the right bank. If there are places where bedrock is not encountered during bridge construction, the bank will be armored with riprap. Riprap will armor the right bank.

The right-of-way and centerline were marked in the field prior to the Forest Practices pre-application field review. The group agreed that the proposed bridge and road construction has a low likelihood to cause movement or deliver sediment to Stream A.

5.0 Forest Practice Rule Statements

The following are the required Forest Practice Rule statements addressing WAC 222-10-030 (1) (a,b,c). These responses are based on the data and discussion presented above.

(a) The likelihood that the proposed forest practices will cause movement on the potentially unstable slopes or landforms, or contribute to further movement of a potentially unstable slope or landform.

We did not observe evidence of debris flow activity in the site vicinity in the historic aerial imagery, nor did we observe evidence of shallow landslide activity on the inner gorge slope within the right-of-way. Fill will not be placed within the channel. If there are places where bedrock is not encountered during bridge construction, the bank will be armored with riprap. Riprap will armor the right bank. Therefore, it is unlikely that the proposed forest practices will cause or contribute to movement on the inner gorge slopes.

(b) The likelihood of delivery of sediment or debris to a public resource, or in a manner that would threaten public safety:

The right bank channel sidewall has exposed, competent bedrock. Shallow, local soil accumulations within the inner gorge may intermittently erode and seasonally deliver sediment to the stream. However, there is a low likelihood that the proposed road construction will result in shallow landslides that deliver sediment to Stream A.

(c) Any possible mitigation for the identified hazards and risks:

The primary mitigation for the identified hazards and risks is avoidance. The bridge spans the channel and no fill will be placed within the stream bed. If soil instead of bedrock is encountered during bridge construction, the soil will be armored with rip rap.

6.0 Assessment Limitations

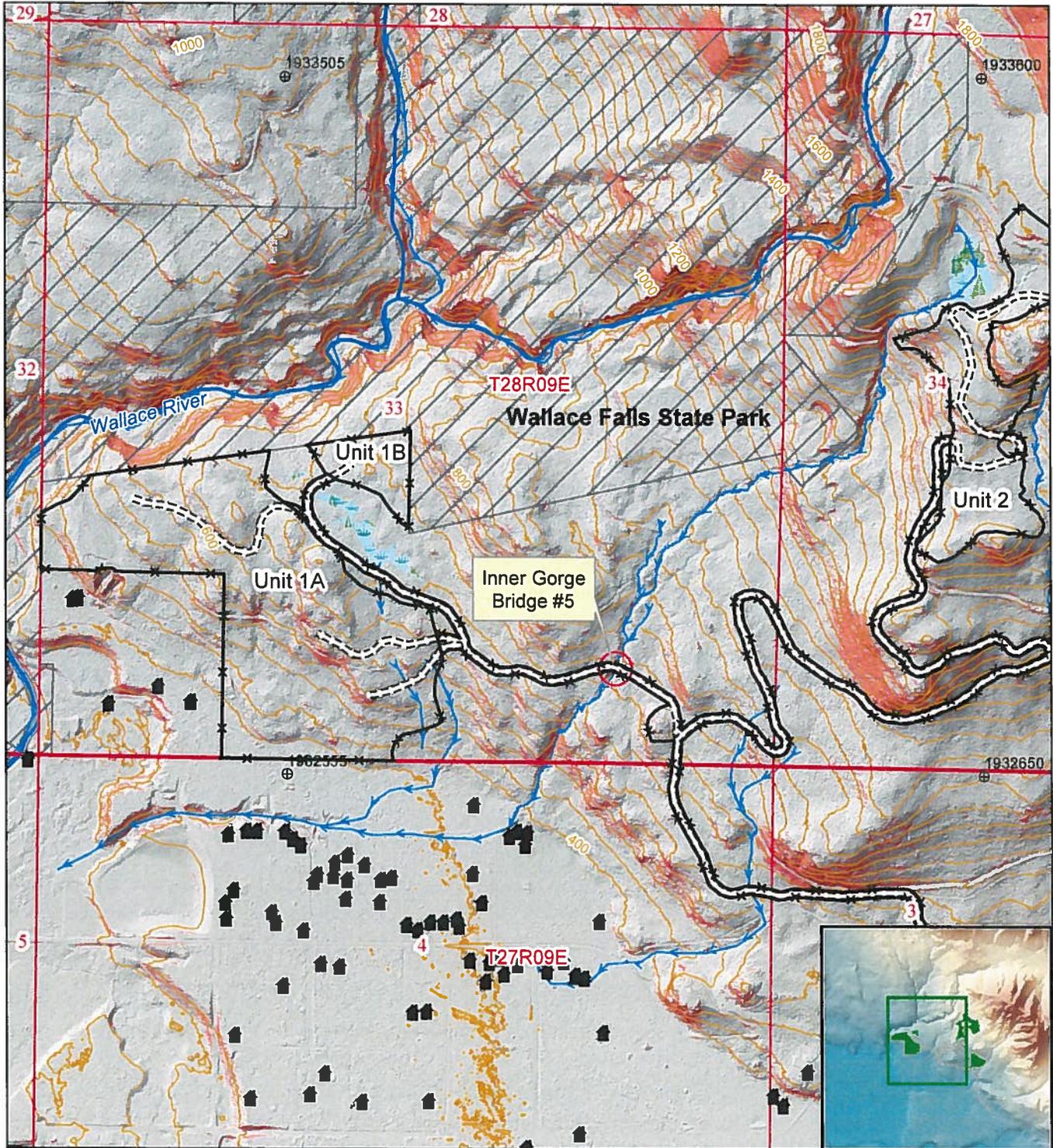
This report is intended to be submitted with the forest practices application (FPA) for the Middle May timber harvest to meet the requirements of a Class IV-special classification and to document licensed engineering geologist/qualified expert involvement in the road design. Mitigations presented in this report were developed collaboratively with the sale foresters and District Engineer. The conclusions presented in this report are based on observed site conditions as they existed at the time of the field visits. Site conditions can change with time and additional geologic information may become available. If this occurs, our geologic interpretations and recommendations may require modification. It is not possible to fully define the geologic conditions of the site based on this limited investigation; however, the work was performed using practices consistent with geologic and geotechnical industry standards in the region for forest

slope stability. It is not possible to predict slope movement with certainty with the available scientific knowledge.

If any changes in the proposed FPA or road plan are formulated or carried out differently in the field than currently proposed, our conclusions and recommendations shall not be considered valid unless those changes are reviewed in writing by the author or author's representative.

7.0 Geologist Qualifications

Jennifer Parker has a Bachelor of Arts degree, (2003) from Whitman College, Walla Walla, Washington in Geology and Environmental Studies and a Master of Science degree (2007) from the University of New Mexico, Albuquerque, NM, with an emphasis on geomorphology. Her academic research involved mapping fire-related debris-flow deposits in the Sacramento Mountains, New Mexico. Previous work experience includes working as an engineering geologist for Shannon & Wilson, Inc. (2007-2016). She has been employed by the Forest Resources Division of the Washington Department of Natural Resources since January 2017. Her work with the agency is related to slope stability assessments of proposed land management activities. Ms. Parker is a Licensed Engineering Geologist (LEG #2892) in the state of Washington and meets the definition of a "qualified expert" as outlined in WAC 222-10-030(5).



Legend

- | | | |
|-----------------------------|--------------------------|-----------------------|
| Harvest Unit Boundary | Structures* | Slope 0 - 70% |
| Forester-delineated stream | Township | Slope >70% |
| Major Stream | Section | Tics - 5000' Interval |
| Forester-delineated wetland | Wallace Falls State Park | |
| Proposed Roads | 40-ft. Contour | |

*Note: Structure locations were approximately mapped using a 2018 orthophotograph.

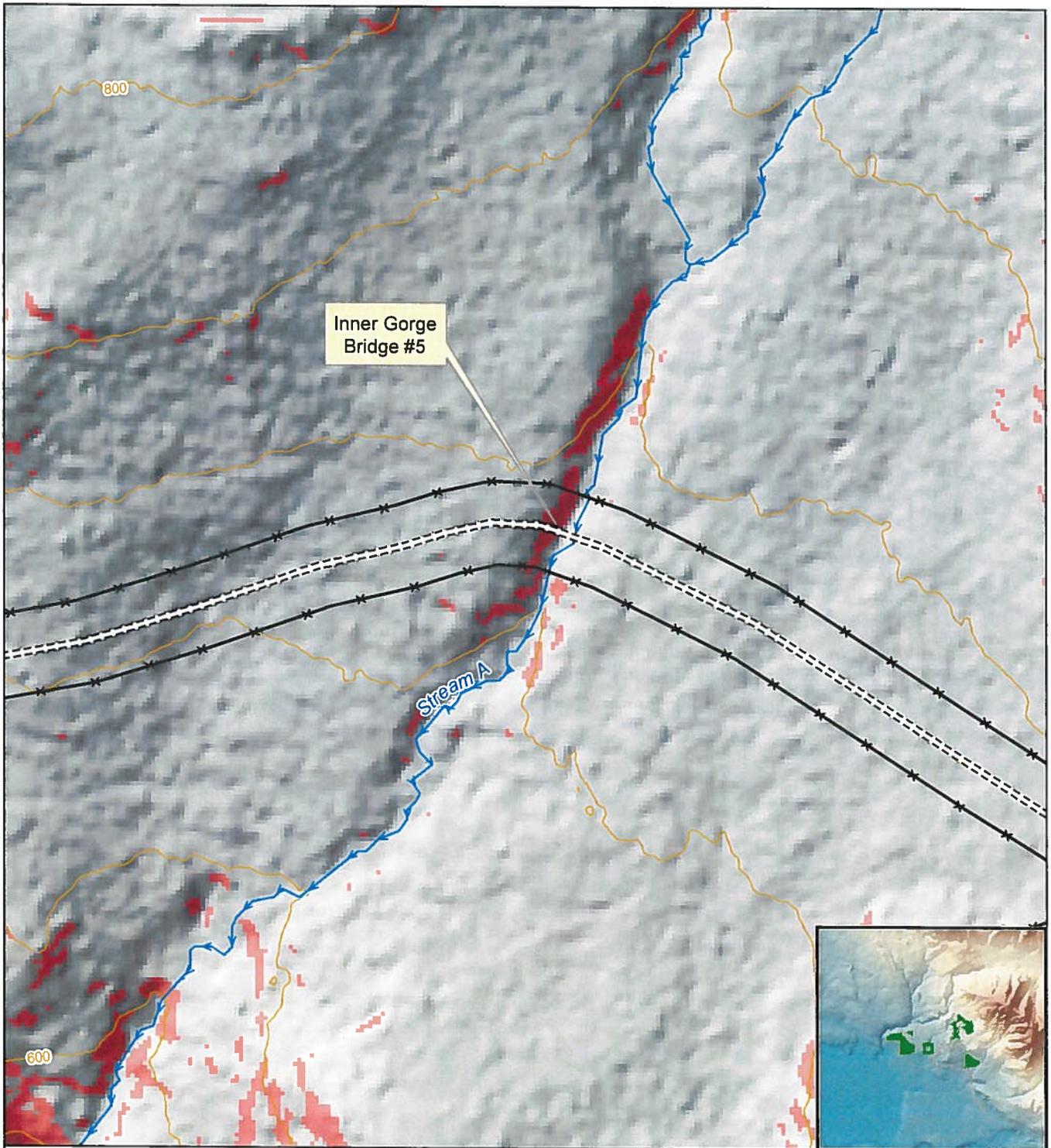
Fig. 2

SITE MAP
Middle May Timber Sale

1,000 Ft. Scale 1:12,000

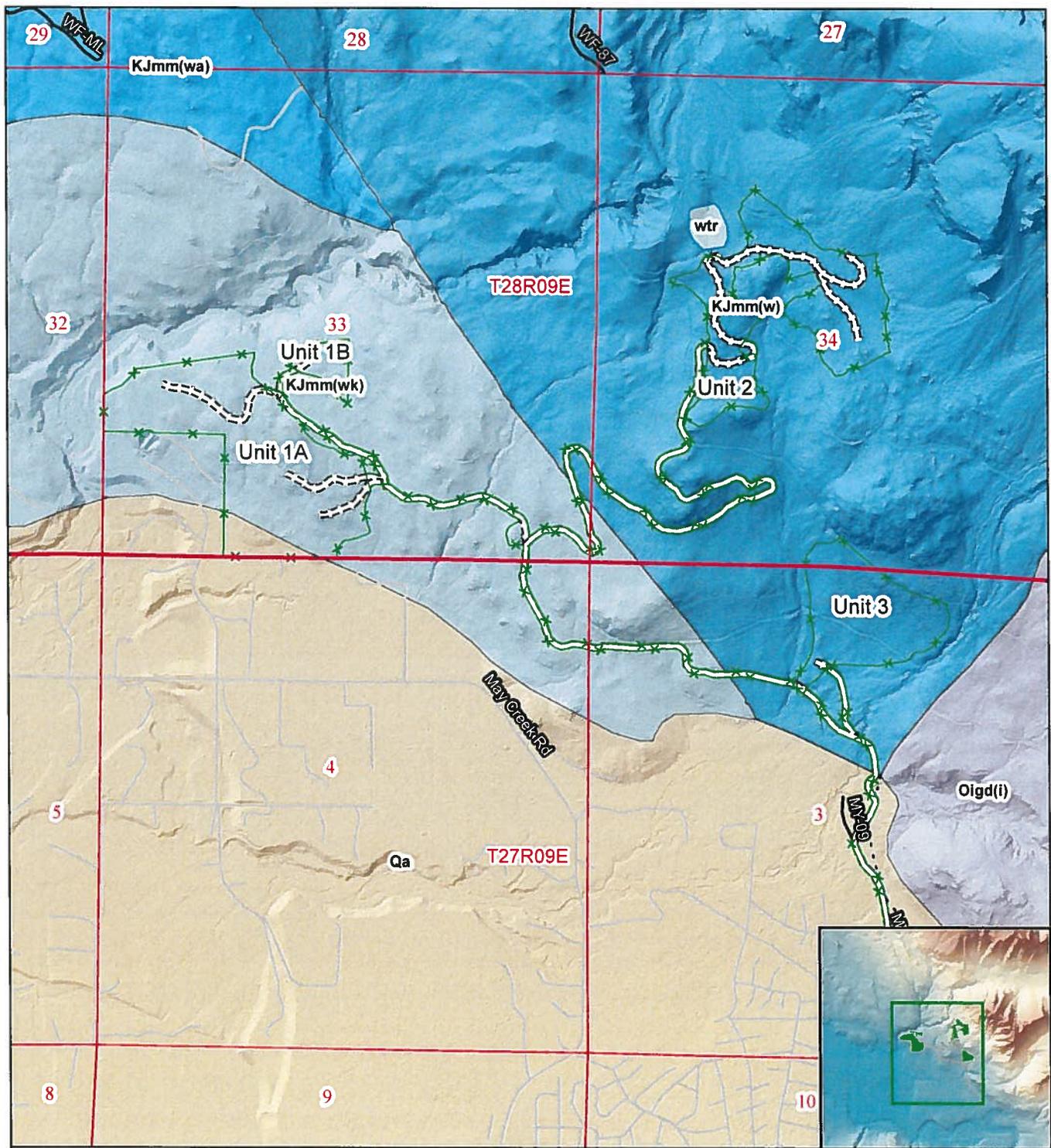
Washington State Department of Natural Resources





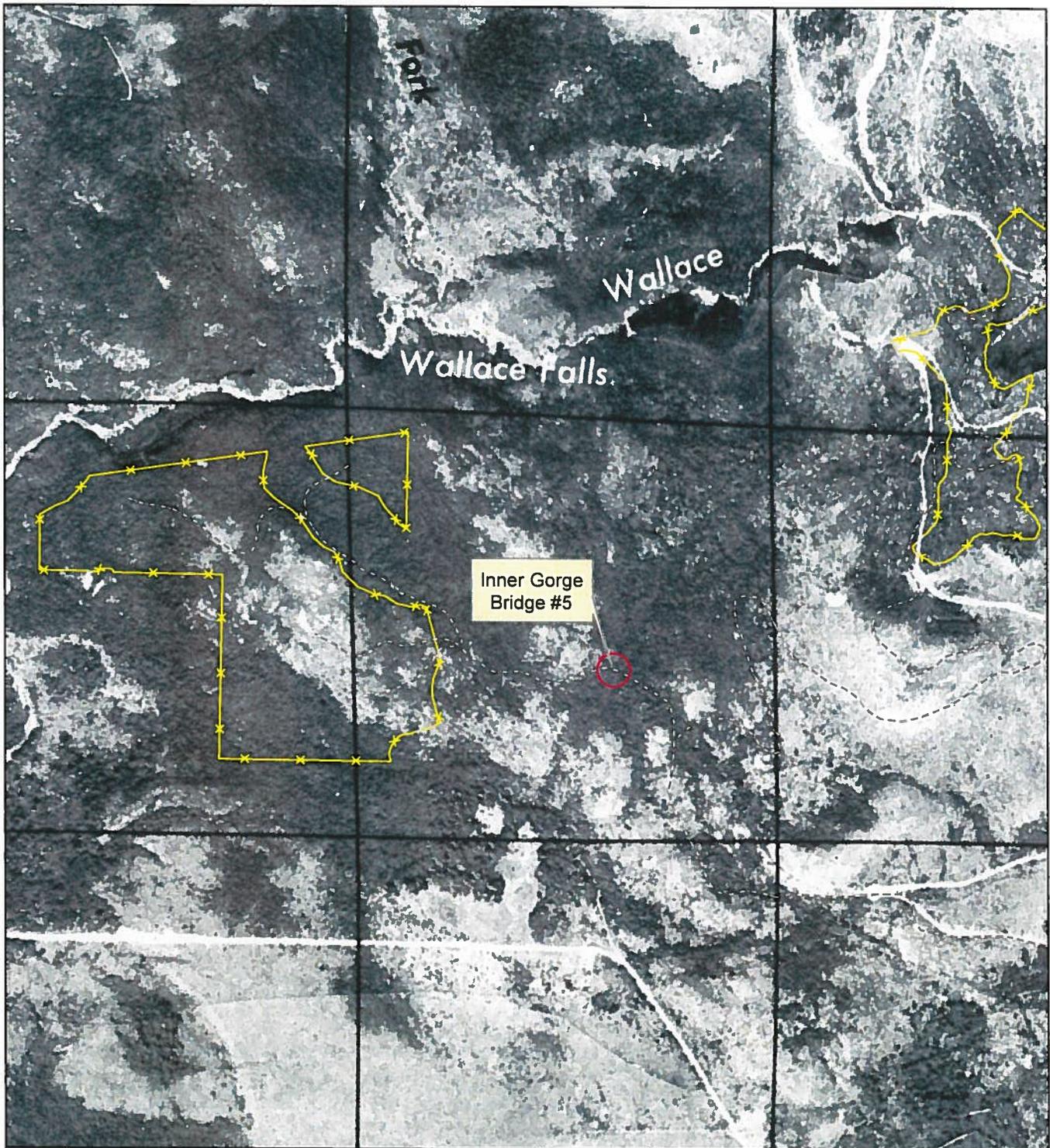
Legend

-  Right-of-Way
-  Forester-delineated stream
-  Proposed Roads
-  Slope 0 - 70%
-  Slope >70%
-  40-ft. Contour



- Legend**
- Harvest Unit Boundary
 - Proposed Roads
 - Geologic Units 100K**
 - KJmm(w) - marine metasedimentary rocks
 - KJmm(wk) - marine metasedimentary rocks
 - KJmm(wa) - marine metasedimentary rocks
 - Oigd(i) - Index batholith granodiorite
 - Qa - alluvium
 - wtr - water

Modified from: Tabor, R.W., Frizzell, V.A., Booth, D.B., Watt, R.B., Whetten, J.T., and Zartman, R.E. 1993. Geologic map of the Skykomish River 30- by 60-minute quadrangle, Washington. U.S. Geological Survey, miscellaneous investigations series map I-1963, U.S. Department of the Interior.



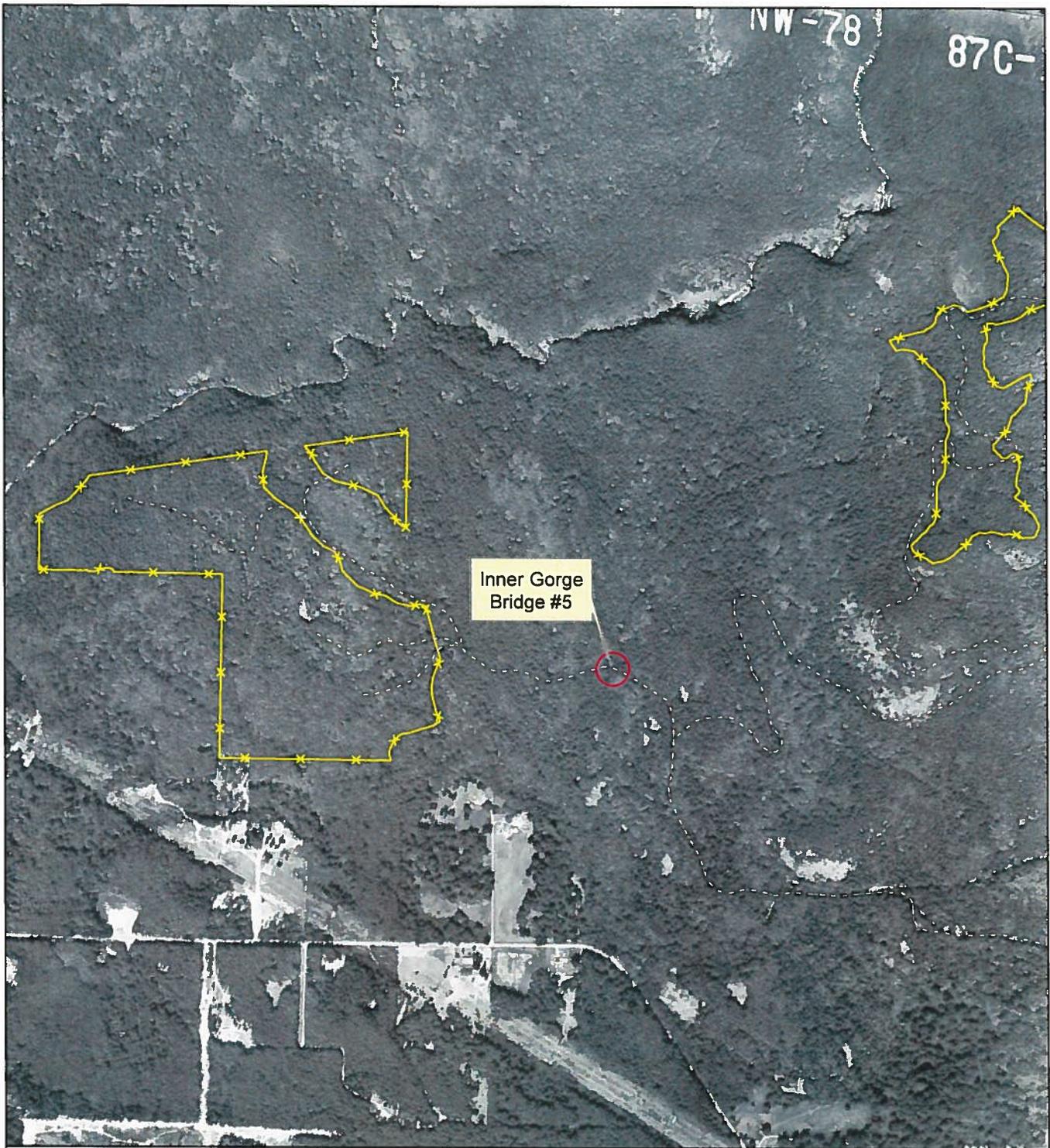
Legend

- Harvest Unit Boundary
- Proposed Roads



Legend

-  Harvest Unit Boundary
-  Proposed Roads



Legend

- Harvest Unit Boundary
- Proposed Roads

Fig. 7

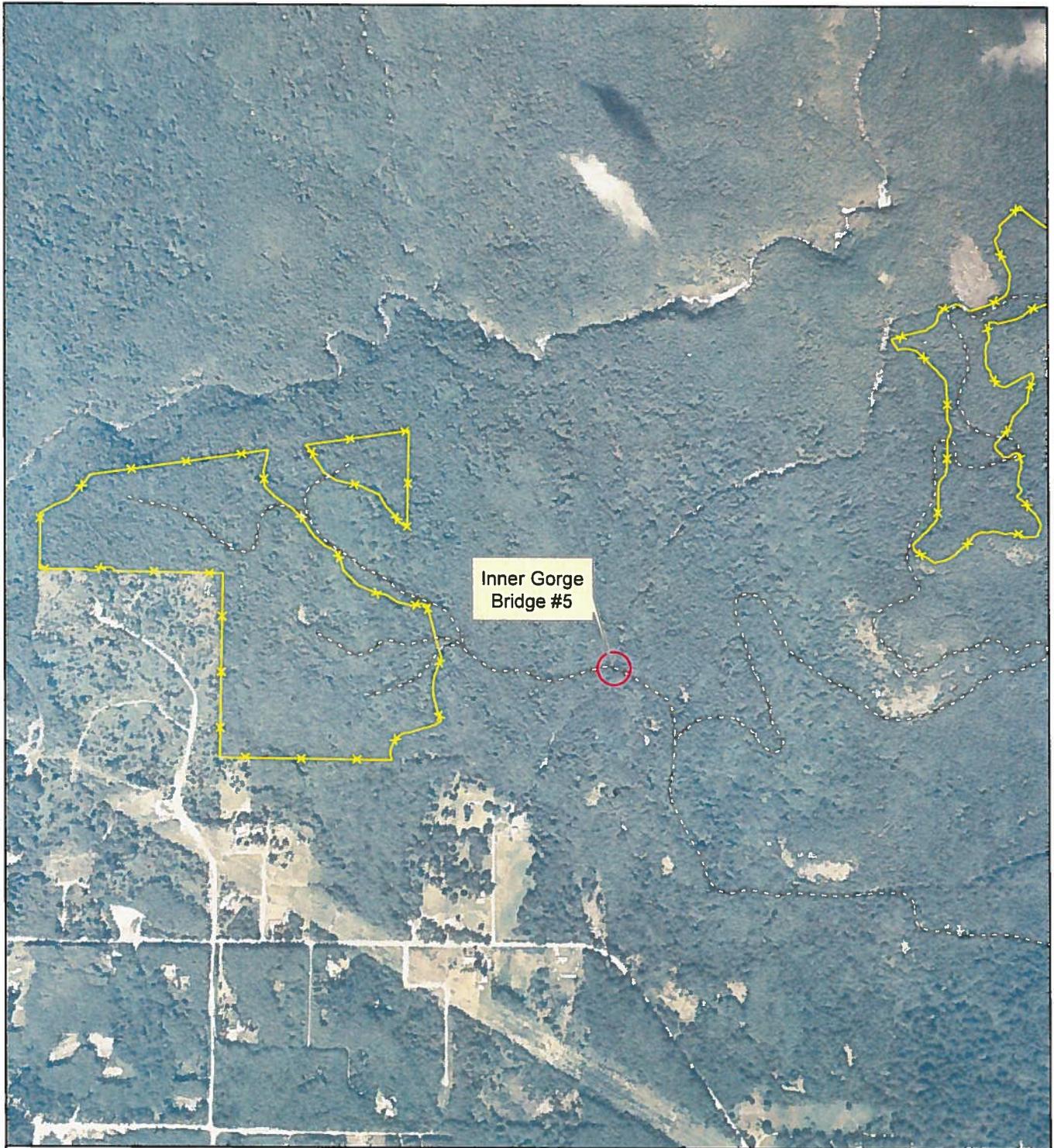
1978 AERIAL IMAGERY
Middle May Timber Harvest

1,000 Ft.

Scale 1:12,000

Washington State Department of Natural Resources





Legend

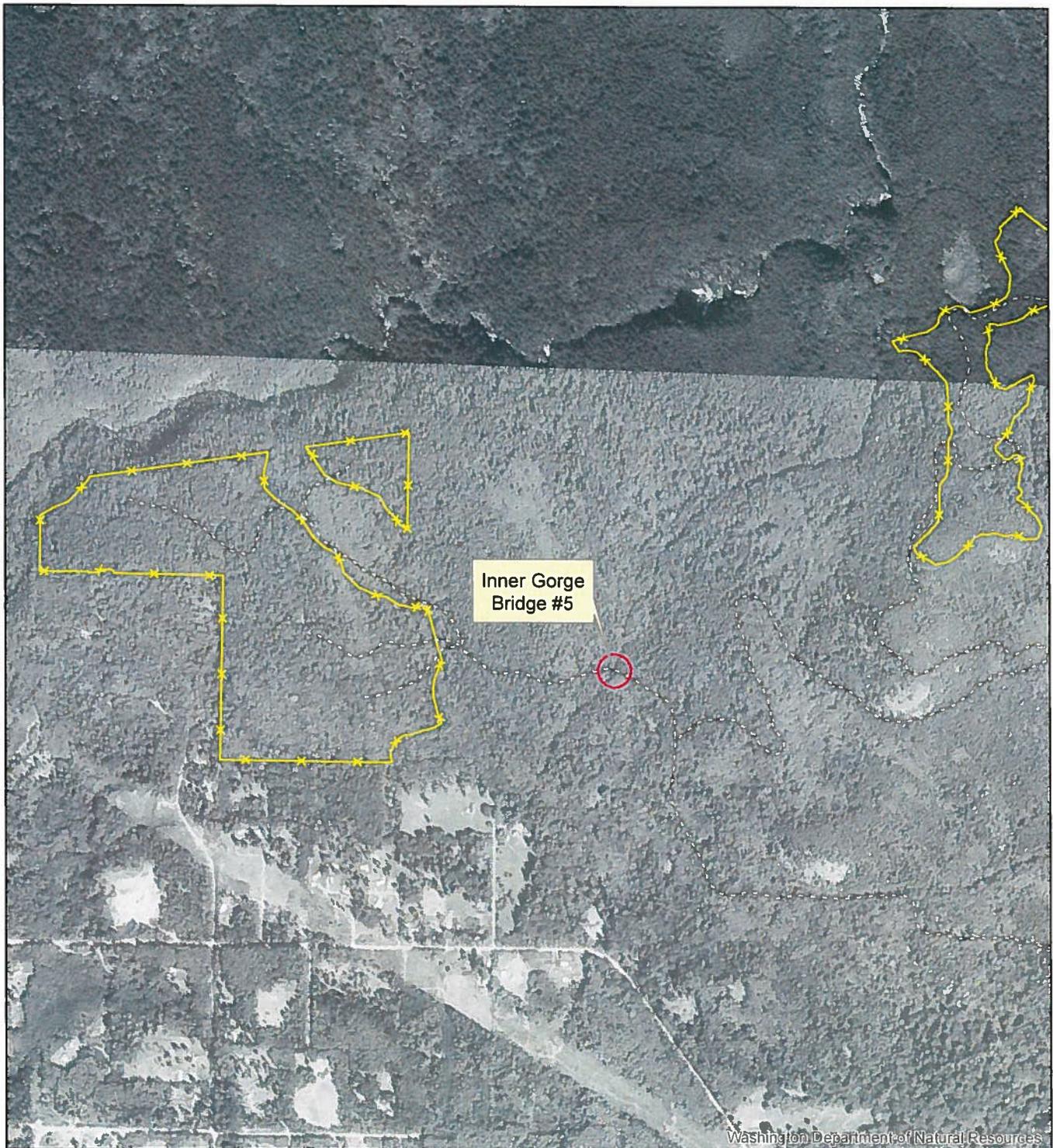
-  Harvest Unit Boundary
-  Proposed Roads

Fig. 8

1983 AERIAL IMAGERY
Middle May Timber Harvest

1,000 Ft.  Scale 1:12,000
Washington State Department of Natural Resources





Legend

-  Harvest Unit Boundary
-  Proposed Roads

Fig. 9

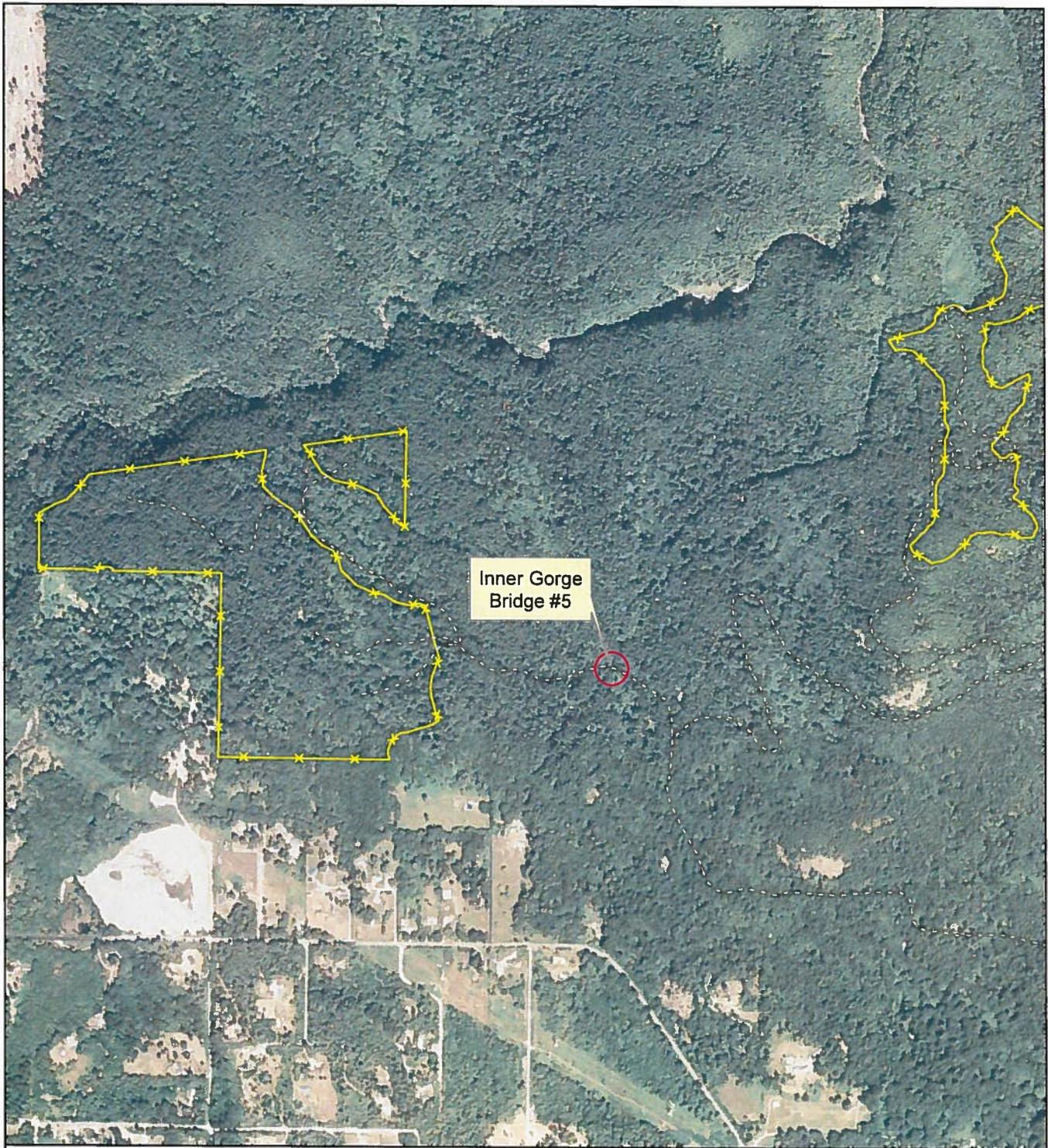
1990'S AERIAL IMAGERY
Middle May Timber Harvest

1,000 Ft.


Scale 1:12,000

Washington State Department of Natural Resources

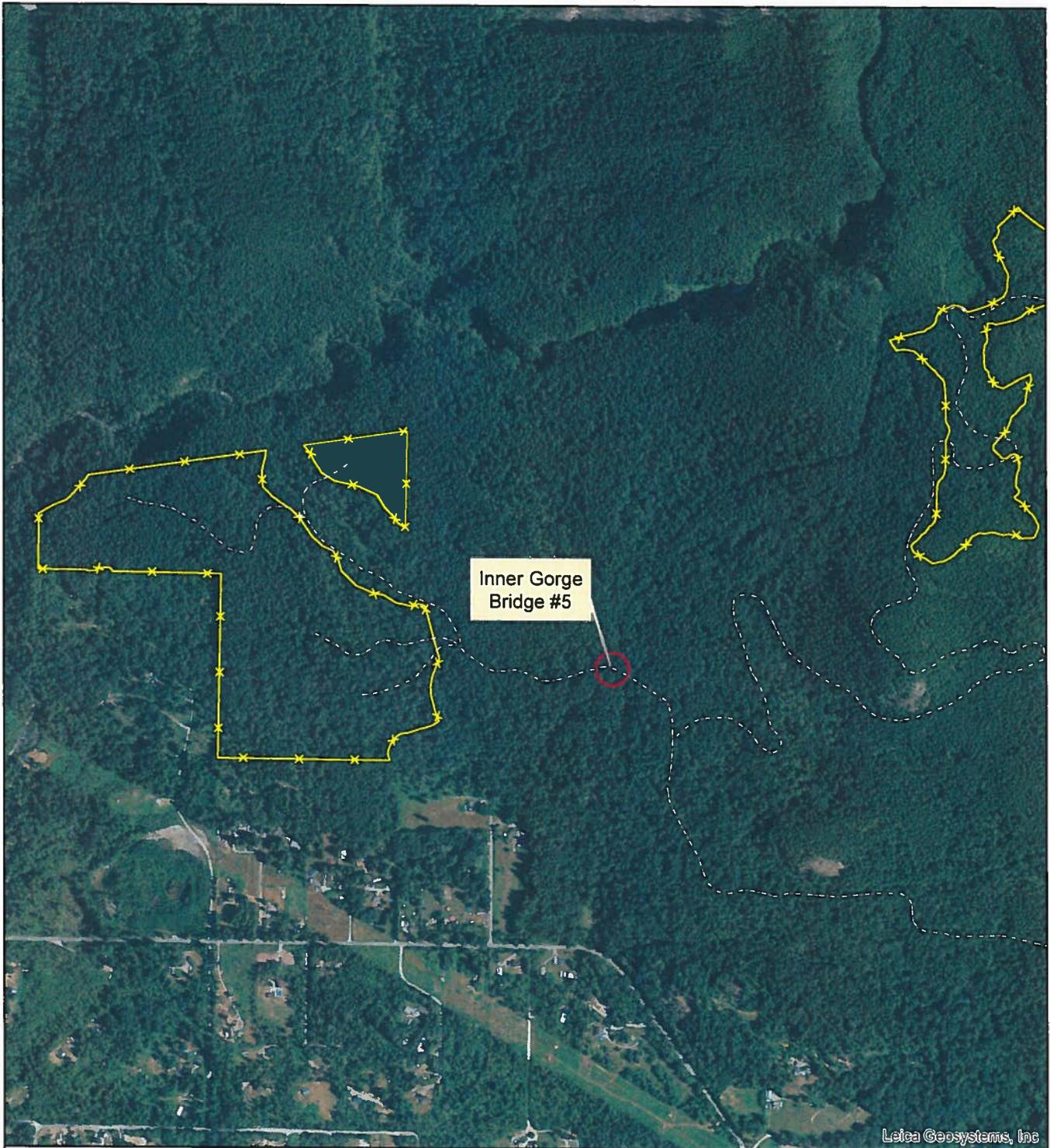




Inner Gorge
Bridge #5

Legend

- Harvest Unit Boundary
- Proposed Roads



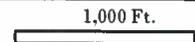
Leica Geosystems, Inc

Legend

- Harvest Unit Boundary
- Proposed Roads

Fig. 11

2018 AERIAL IMAGERY
Middle May Timber Harvest



Scale 1:12,000

Washington State Department of Natural Resources



STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES

MIDDLE MAY TIMBER SALE ROAD PLAN
SNOHOMISH COUNTY
CASCADE DISTRICT
NORTHWEST REGION

AGREEMENT NO.: 30 -100161

STAFF ENGINEER: A. HALGREN

DATE: NOVEMBER 1, 2019

SECTION 0 – SCOPE OF PROJECT

0-1 ROAD PLAN SCOPE

Clauses in this road plan apply to all road related work, including landings and rock source development, unless otherwise noted.

0-2 REQUIRED ROADS

The specified work on the following roads is required.

<u>Road</u>	<u>Stations</u>	<u>Type</u>
MY-ML	0+00 to 20+30	MAINTENANCE
MY-ML	20+30 to 54+10	RECONSTRUCTION
MY-ML	54+10 to 234+31	CONSTRUCTION
MY-04	0+00 to 156+70	MAINTENANCE
MY-RRG15	0+00 to 31+40	ABANDONMENT*
MY-RRG15	30+40 to 31+40	STREAM BANK RESTORATION*
MY-21	0+00 to 39+76	CONSTRUCTION

*The required work is located on an orphaned grade. See also SECTION 11-4 STREAM BANK RESTORATION and STREAM BANK RESTORATION DETAIL.

0-3 OPTIONAL ROADS

The specified work on the following roads is not required. Any optional roads built by the Purchaser must meet all the specifications in the road plan.

<u>Road</u>	<u>Stations</u>	<u>Type</u>
MY-12	0+00 to 10+09	CONSTRUCTION
MY-2104	0+00 to 11+91	CONSTRUCTION
MY-2104-01	0+00 to 8+11	CONSTRUCTION
MY-2106	0+00 to 16+53	CONSTRUCTION
MY-43	0+00 to 9+40	CONSTRUCTION

0-4 CONSTRUCTION

Construction includes, but is not limited to clearing, grubbing, excavation and embankment to sub-grade, full bench sidecast, full bench end-haul, landing and turnout construction, culvert installation, geotextile installation, steel modular bridge installation, concrete bridge installation, drill and shoot, gate installation, application of 3-inch-minus ballast rock and application of shot rock.

0-5 RECONSTRUCTION

Reconstruction includes, but is not limited to blading, shaping, and ditching the road surface, brushing, clearing, grubbing, culvert installation, gate installation, and application of 3-inch-minus ballast rock.

0-6 PRE-HAUL MAINTENANCE

Pre-haul maintenance includes, but is not limited to brushing, existing culvert cleanout, and blading, shaping, and ditching the road surface.

0-7 POST-HAUL MAINTENANCE

This project includes post-haul road maintenance listed in Clause 9-5 POST-HAUL MAINTENANCE.

0-10 ABANDONMENT

This project includes abandonment listed in Clause 9-21 ROAD ABANDONMENT.

0-12 DEVELOP ROCK SOURCE

Purchaser shall develop new rock sources. Rock source development will involve clearing, stripping, drilling, shooting, and processing rock to generate shot rock, riprap, and 3-inch-minus ballast. Work for developing rock sources is listed in Section 6 ROCK AND SURFACING.

0-13 STRUCTURES

Purchaser shall provide and install steel modular bridges, concrete bridge, and gate. Requirements for these structures are listed in Section 7 STRUCTURES.

SECTION 1 – GENERAL

1-1 ROAD PLAN CHANGES

If the Purchaser desires a change from this road plan including, but not limited to, relocation, extension, change in design, or adding roads; a revised road plan must be submitted in writing to the Contract Administrator for consideration. Before work begins, Purchaser shall obtain approval from the State for any submitted plan that changes the scope of work or environmental condition from the original road plan.

1-2 UNFORESEEN CONDITIONS

Quantities established in this road plan are minimum acceptable values. Additional quantities required by the state due to unforeseen conditions, or Purchaser's choice of construction season or techniques will be at the Purchaser's expense. Unforeseen conditions include, but are not limited to, solid subsurface rock, subsurface springs, saturated ground, and unstable soils.

1-3 ROAD DIMENSIONS

Purchaser shall perform road work in accordance with the dimensions shown on the TYPICAL SECTION SHEET and the specifications within this road plan.

1-4 ROAD TOLERANCES

Purchaser shall perform road work within the tolerances listed below. The tolerance class for each road is listed on the TYPICAL SECTION SHEET.

<u>Tolerance Class</u>	<u>A</u>	<u>B</u>	<u>C</u>
Road and Subgrade Width (feet)	+1.5	+1.5	+2.0
Subgrade Elevation (feet +/-)	0.5	1.0	2.0
Centerline alignment (feet lt./rt.)	1.0	1.5	3.0
Bridge Elevation (feet)	±0.25	-	-

1-5 DESIGN DATA

Design data (for bridges and switchbacks) is available upon request at the Department of Natural Resources Northwest Region Office in Sedro Woolley, WA.

1-6 ORDER OF PRECEDENCE

Any conflict or inconsistency in the road plan will be resolved by giving the documents precedence in the following order:

1. Addenda.
2. Designs or Plans. On designs and plans, figured dimensions shall take precedence over scaled dimensions.
3. Road Plan Clauses.
4. Typical Section Sheet.
5. Standard Lists.
6. Standard Details.
7. Road Work maps.

In case of any ambiguity or dispute over interpreting the road plan, the Contract Administrator's or designee's decision will be final.

1-8 REPAIR OR REPLACEMENT OF DAMAGED MATERIALS

Purchaser shall repair or replace all materials, roadway infrastructure, and road components damaged during road work or operation activities. The Contract Administrator will direct repairs and replacements. Repairs to structural materials must be made in accordance with the manufacturer’s recommendation, and may not begin without written approval from the Contract Administrator.

1-9 DAMAGED METALLIC COATING

Any cut ends, or damaged galvanized or aluminized coating on existing or new bridge components, culverts, downspouts, and flumes must be cleaned and treated with a minimum of two coats of zinc rich paint or cold galvanizing compound.

1-16 CONSTRUCTION STAKES SET BY STATE

Purchaser shall perform work on the following road(s) in accordance with the construction stakes and reference points set in the field for grade and alignment.

<u>Road</u>	<u>Stations</u>	<u>Type</u>
MY-ML	54+10 to 54+88	Bridge (1) installation
MY-ML	61+85 to 62+35	Bridge (2) installation
MY-ML	72+11 to 72+71	Bridge (3) installation
MY-ML	97+53 to 97+68	Bridge (4) installation
MY-21	6+92 to 7+42	Bridge (5) installation

1-18 REFERENCE POINT DAMAGE

Purchaser shall reset reference points (RPs) that were moved or damaged at any time during construction to their original locations. Excavation and embankment may not proceed on road segments controlled by said RPs until Purchaser resets all moved or damaged RPs.

1-21 HAUL APPROVAL

Purchaser shall not use roads under this road plan for any hauling other than timber cut on the right-of-way, without written approval from the Contract Administrator.

1-22 WORK NOTIFICATIONS

On the following road(s), Purchaser shall notify the Contract Administrator within 14 days, and a minimum of 7 calendar days, before work begins.

<u>Road</u>	<u>Stations</u>	<u>Note</u>
MY-ML	54+10 to 54+88	Bridge (1) installation
MY-ML	61+85 to 62+35	Bridge (2) installation
MY-ML	72+11 to 72+71	Bridge (3) installation
MY-ML	97+53 to 97+68	Bridge (4) installation
MY-ML	118+45 to 122+19	Switchback (1)
MY-ML	133+61 to 136+99	Switchback (2)
MY-ML	159+36 to 165+43	Switchback (3)
MY-ML	191+45 to 195+53	Switchback (4)
MY-ML	198+96 to 202+70	Switchback (5)
MY-ML	210+91 to 215+92	Switchback (6)
MY-21	6+92 to 7+42	Bridge (5) installation

1-25 ACTIVITY TIMING RESTRICTION

The specified activities are not allowed during the listed closure period(s) unless authorized in writing by the Contract Administrator.

<u>Road</u>	<u>Stations</u>	<u>Activity</u>	<u>Closure Period</u>
	ALL	Rock hauling, construction, reconstruction, or abandonment	November 1 to March 31
MY-ML	54+10 to 54+88, 61+85 to 62+35, 72+11 to 72+71, 97+53 to 97+68	In-stream work for structure installation	September 30 – July1, not to be waived by the Contract Administrator except with written approval from WDFW and Forest Practices
MY-21	6+92 to 7+42		
MY-21	23+63 to 38+63	Construction	October 15 th to June 15 th to protect WMZ function
MY-2106	0+00 to 0+92		

1-26 OPERATING DURING CLOSURE PERIOD

If permission is granted to operate during a closure period listed in Clause 1-25 ACTIVITY TIMING RESTRICTION, Purchaser shall provide a maintenance plan to include further protection of state resources. Purchaser shall obtain written approval from the Contract Administrator for the maintenance plan, and shall put preventative measures in place before operating during the closure period. Purchaser is required to maintain all haul roads at their own expense including those listed in Contract Clause C-060 DESIGNATED ROAD MAINTAINER. If other operators are using, or desire to use these roads, a joint operating plan must be developed. All parties shall follow this plan.

1-29 SEDIMENT RESTRICTION

Purchaser shall not allow silt-bearing runoff to enter any streams.

1-30 CLOSURE TO PREVENT DAMAGE

In accordance with Contract Clause G-220 STATE SUSPENDS OPERATION, the Contract Administrator will suspend road work or hauling right-of-way timber, forest products, or rock under the following conditions:

- Wheel track rutting exceeds 4 inches on crushed rock roads.
- Surface or base stability problems persist.
- Weather is such that satisfactory results cannot be obtained in an area of operations.
- When, in the opinion of the Contract Administrator excessive road damage or rutting may occur.

Operations must stop unless authority to continue working or hauling is granted in writing by the Contract Administrator. In the event that surface or base stability problems persist, Purchaser shall cease operations, or perform corrective maintenance or repairs, subject to specifications within this road plan. Before and during any suspension, Purchaser shall protect the work from damage or deterioration.

1-32 BRIDGE SURFACE RESTRICTION

The use of metal tracked equipment is not allowed on concrete or wood-deck bridge surfaces at any time. If Purchaser must run equipment on bridge surfaces, then rubber tired equipment or other methods, approved in writing by Contract Administrator, must be used.

If tracked equipment is used on concrete or wood-deck bridge surfaces, Purchaser shall immediately cease all road construction and hauling operations. Purchaser shall remove any dirt, rock, or other material tracked or spilled on the bridge surface(s) and have surface(s) evaluated by the District Engineer or their designee for any damage caused by transporting equipment. Any damage to the surface(s) will be repaired, at the Purchaser's expense, as directed by the Contract Administrator.

1-33 SNOW PLOWING RESTRICTION

Snowplowing will be allowed after the execution of a SNOW PLOWING AGREEMENT, which is available from the Contact Administrator upon request. If damage occurs while plowing, further permission to plow may be revoked by the Contract Administrator.

1-42 UTILITY ACCESS ROAD

The following road(s) intersect(s) existing utility access roads. Purchaser shall conduct road work on the intersecting roads so that the utility access roads are accessible at all times.

<u>Road</u>	<u>Stations</u>
MY-ML	0+00 to 20+30

1-43 ROAD WORK AROUND UTILITIES

Road work is in close proximity to a utility. Known utilities are listed, but it is the Purchaser’s responsibility to identify any utilities not listed. Purchaser shall work in accordance with all applicable laws or rules concerning utilities. Purchaser is responsible for all notification, including “call before you dig”, and liabilities associated with the utilities and their rights-of-way. Purchaser shall notify the Bonneville Power Administration before starting road work.

<u>Road</u>	<u>Stations</u>	<u>Utility</u>	<u>Utility Contact</u>
MY-ML	0+00 to 20+30	Bonneville Power Administration (overhead powerlines)	1-800-282-3713

SECTION 2 – MAINTENANCE

2-1 GENERAL ROAD MAINTENANCE

Purchaser shall maintain all roads used under this contract in accordance with the FOREST ACCESS ROAD MAINTENANCE SPECIFICATIONS for the entire term of this contract. Maintenance is required even during periods of inactivity.

2-2 ROAD MAINTENANCE – PURCHASER MAINTENANCE

Purchaser shall perform maintenance on roads listed in Contract Clause C-050 PURCHASER ROAD MAINTENANCE AND REPAIR in accordance with FOREST ACCESS ROAD MAINTENANCE SPECIFICATIONS.

2-4 PASSAGE OF LIGHT VEHICLES

Purchaser shall maintain the following road(s) in a condition that will allow the passage of light administrative vehicles.

<u>Road</u>	<u>Stations</u>
MY-ML	0+00 to 20+30

2-7 CLEANING DITCHES, HEADWALLS, AND CATCH BASINS

On the following road(s), Purchaser shall clean ditches, headwalls, and catchbasins. Work must be completed before rock haul and must be done in accordance with the Forest Access Road Specifications.

<u>Road</u>	<u>Stations</u>
MY-04	0+00 to 156+70

SECTION 3 – CLEARING, GRUBBING, AND DISPOSAL

3-1 BRUSHING

On the following road(s), Purchaser shall cut vegetative material up to 6 inches in diameter, including limbs, as shown on the BRUSHING DETAIL. Brushing must be achieved by mechanical cutting of brush, trees, and branches. Root systems and stumps of cut vegetation may not be disturbed unless directed by the Contract Administrator. Purchaser shall remove brushing debris from the road surface, ditchlines, and culvert inlets and outlets.

<u>Road</u>	<u>Stations</u>
MY-ML	0+00 to 20+30
MY-04	0+00 to 156+70

3-5 CLEARING

Purchaser shall fall all vegetative material larger than 2 inches DBH or over 5 feet high between the marked right-of-way boundaries or if not marked in the field, between the clearing limits specified on the TYPICAL SECTION SHEET. Clearing must be completed before starting excavation and embankment.

3-6 CLEARING WITHIN RIPARIAN AREA AT TYPE 1-3 STREAM CROSSING

At the following stream crossing location(s), Purchaser shall place a log, with length equal to two (2) times the width of the ordinary high water, from the largest diameter class conifer tree cut from within the Inner Zone (25 feet either side of the stream) in the stream in accordance with the Riparian Forest Restoration Strategy.

<u>Road</u>	<u>Stations</u>
MY-ML	54+10 to 54+88, 61+85 to 62+35, 72+11 to 72+71, 97+53 to 97+68
MY-21	6+92 to 7+42

3-8 PROHIBITED DECKING AREAS

Purchaser shall not deck right-of-way timber in the following areas:

- Within the grubbing limits.
- Within 50 feet of any stream.
- In locations that interfere with the construction of the road prism.
- In locations that impede drainage.
- On slopes greater than 40%.
- Against standing trees.

3-10 GRUBBING

Purchaser shall remove all stumps between the grubbing limits specified on the TYPICAL SECTION SHEET and within waste and debris areas. Purchaser shall also remove stumps with undercut roots outside the grubbing limits. Grubbing must be completed before starting excavation and embankment.

3-11 GRUBBING WITHIN RIPARIAN AREA AT TYPE 1-3 STREAM CROSSING

At the following stream crossing location(s), Purchaser shall retain all grubbed stumps (root wads) within the Inner Zone (25 feet either side of the stream) for placement in accordance with the Riparian Forest Restoration Strategy. Three root wads must be placed in or adjacent to the stream channel. The remaining stumps grubbed from the Inner Zone must be placed at least 50 feet from the roadway in the Middle (25 feet to 100 feet from the stream) or the Outer Zones (remaining portion of RMZ).

<u>Road</u>	<u>Stations</u>
MY-ML	54+10 to 54+88, 61+85 to 62+35, 72+11 to 72+71, 97+53 to 97+68
MY-21	6+92 to 7+42

3-12 STUMP PLACEMENT

On the following road(s), Purchaser shall place grubbed stumps adjacent to the road shoulder or as directed by the Contract Administrator and in compliance with all other clauses in this road plan. Stumps must be positioned upright, with root wads in contact with the forest floor on stable locations.

<u>Road</u>	<u>Stations</u>	<u>Comments</u>
MY-21	STA 23+63 to 33+90	Place stumps on downhill side, below fill slope
	33+90 to 38+63	Place stumps in two rows on both sides of the road

3-20 ORGANIC DEBRIS DEFINITION

Organic debris is defined as all vegetative material not eligible for removal by Contract Clause G-010 PRODUCTS SOLD AND SALE AREA or G-011 RIGHT TO REMOVE FOREST PRODUCTS AND CONTRACT AREA, that is larger than one cubic foot in volume within the clearing limits as shown on the TYPICAL SECTION SHEET.

3-21 DISPOSAL COMPLETION

Purchaser shall remove organic debris from the road surface, ditchlines, and culvert inlets and outlets. Purchaser shall complete all disposal of organic debris before the application of rock.

3-22 DESIGNATED WASTE AREA FOR ORGANIC DEBRIS

Waste areas for organic debris shall be located at areas approved in writing by the Contract Administrator.

3-23 PROHIBITED DISPOSAL AREAS

Purchaser shall not place organic debris in the following areas:

- Within 50 feet of a cross drain culvert.
- Within 100 feet of a live stream, or wetland, unless used to comply with the specifications detailed in the Riparian Forest Restoration Strategy, Clause 3-6 CLEARING WITHIN RIPARIAN AREA AT TYPE 1-3 STREAM CROSSING, and Clause 3-11 GRUBBING WITHIN RIPARIAN AREA AT TYPE 1-3 STREAM CROSSING.
- On road subgrades, or excavation and embankment slopes.
- On slopes greater than 50%.
- Within the operational area for cable landings where debris may shift or roll.
- On locations where brush can fall into the ditch or onto the road surface.
- Against standing timber.

3-24 BURYING ORGANIC DEBRIS RESTRICTED

Purchaser shall not bury organic debris unless otherwise stated in this plan.

3-25 SCATTERING ORGANIC DEBRIS

Purchaser shall scatter organic debris outside of the clearing limits in natural openings unless otherwise detailed in this road plan.

3-32 END HAULING ORGANIC DEBRIS

On the following road(s), Purchaser shall end haul or push organic debris to the designated waste areas specified in Clause 3-22 DESIGNATED WASTE AREA FOR ORGANIC DEBRIS.

<u>Road</u>	<u>Stations</u>
MY-ML	STA 116+13 to 117+94

SECTION 4 – EXCAVATION

4-2 PIONEERING

Pioneering may not extend past construction that will be completed during the current construction season. Pioneering may not extend more than 500 feet beyond completed construction unless approved in writing by the Contract Administrator. In addition, the following actions must be taken as pioneering progresses:

- Drainage must be provided on all uncompleted construction.
- Road pioneering operations may not undercut the final cut slope or restrict drainage.
- Culverts at live stream crossings must be installed during pioneering operations prior to embankment.

4-3 ROAD GRADE AND ALIGNMENT STANDARDS

Purchaser shall follow these standards for road grade and alignment:

- Grade and alignment must have smooth continuity, without abrupt changes in direction.
- On temporary roads maximum grades may not exceed 18 percent favorable and 15 percent adverse.
- On permanent roads maximum grades may not exceed 16 percent favorable and 12 percent adverse.
- Minimum curve radius is 60 feet at centerline.
- Maximum grade change for sag vertical curves is 5% in 100 feet.
- Maximum grade change for crest vertical curves is 4% in 100 feet.

Grade limitations and alignment are modified as follows:

<u>Road</u>	<u>Stations</u>	<u>Minimum Curve Radius (ft)</u>	<u>Maximum Grade (%)</u>	
			<u>Favorable</u>	<u>Adverse</u>
MY-ML	118+45 to 122+19	70	12	-
MY-ML	133+61 to 136+99	70	12	-
MY-ML	159+36 to 165+43	70	12	-
MY-ML	191+45 to 195+53	70	12	-
MY-ML	198+96 to 202+70	70	12	-
MY-ML	210+91 to 215+92	70	12	-

4-4 SWITCHBACK STANDARDS

A switchback is defined as a curved segment of road between a beginning and end of the same curve, where the change of traffic travel direction is greater than 90 degrees.

Purchaser shall follow these standards for switchbacks:

- Maximum adverse grades for switchbacks is 10% of the curve radius.
- Maximum favorable grades for switchbacks is 12%.
- Maximum transition grades entering and leaving switchbacks is a 6% grade change.
- Transition grades required to meet switchback grade limitations must be constructed on the tangents preceding and departing from the switchbacks.

4-5 CUT SLOPE RATIO

Purchaser shall construct excavation slopes no steeper than shown on the following table, unless construction staked or designed:

<u>Material Type</u>	<u>Excavation Slope Ratio</u>	<u>Excavation Slope Percent</u>
Common Earth (on side slopes up to 55%)	1:1	100
Common Earth (56% to 70% side slopes)	¾:1	133
Common Earth (on slopes over 70%)	½:1	200
Fractured or loose rock	½:1	200
Hardpan or solid rock	¼:1	400

4-6 EMBANKMENT SLOPE RATIO

Purchaser shall construct embankment slopes no steeper than shown on the following table, unless construction staked or designed:

<u>Material Type</u>	<u>Embankment Slope Ratio</u>	<u>Embankment Slope Percent</u>
Sandy Soils	2:1	50
Common Earth and Rounded Gravel	1½:1	67
Angular Rock	1¼:1	80

4-7 SHAPING CUT AND FILL SLOPE

Purchaser shall construct excavation and embankment slopes to a uniform line and left rough for easier revegetation.

4-8 CURVE WIDENING

The minimum widening placed on the inside of curves is:

- 6 feet for curves of 50 to 79 feet radius.
- 4 feet for curves of 80 to 100 feet radius.

4-9 EMBANKMENT WIDENING

The minimum embankment widening is:

- 2 feet for embankment heights at centerline of 2 to 6 feet.
- 4 feet for embankment heights at centerline of greater than 6 feet.

Purchaser shall apply embankment widening equally to both sides of the road to achieve the required width.

4-12 FULL BENCH CONSTRUCTION

On the following road(s) and where side slopes exceed 50% full bench construction shall be utilized for the entire subgrade width except as construction staked or designed. If designated, waste material shall be end hauled to a location specified in Clause 4-37 WASTE AREA LOCATION.

<u>Road</u>	<u>Full Bench Location (STA)</u>	<u>Comments</u>
MY-ML	116+13 to 117+53	Wet area above steep slope.
MY-ML	150+56 to 155+18	-
MY-ML	159+81 to 160+21	-
MY-ML	169+16 to 171+15	-
MY-ML	174+68 to 179+00	Rock may be used for road construction with in-place processing if approved in writing by the contract administrator.
MY-12	1+42 to 1+81	Located within a channel migration zone (CMZ). Full bench construction is required to achieve grade through swales. Material may be sidecast and staged for requirements as listed in 9-24 HEAVY ABANDONMENT.
MY-12	3+57 to 3+88	
MY-12	4+62 to 4+90	

4-21 TURNOUTS

Purchaser shall construct turnouts intervisible with a maximum distance of 1,000 feet between turnouts unless otherwise shown on drawings. Locations may be adjusted to fit the final subgrade alignment and sight distances. Locations are subject to written approval by the Contract Administrator. Minimum dimensions are shown on the TYPICAL SECTION SHEET.

4-25 DITCH CONSTRUCTION AND RECONSTRUCTION

Purchaser shall construct or reconstruct ditches into the subgrade as specified on the TYPICAL SECTION SHEET. Ditches must be constructed concurrently with construction of the subgrade.

4-28 DITCH DRAINAGE

Ditches must drain to cross-drain culverts or ditchouts.

4-29 DITCHOUTS

Purchaser shall construct ditchouts at locations shown on the MATERIALS LIST and as needed or as directed by the Contract Administrator. Ditchouts must be constructed in a manner that diverts ditch water onto the forest floor and must have excavation backslopes no steeper than a 1:1 ratio.

4-35 WASTE MATERIAL DEFINITION

Waste material is defined as all dirt, rock, mud, or related material that is extraneous or unsuitable for construction material. Waste material, as used in Section 4 EXCAVATION, is not organic debris.

4-36 DISPOSAL OF WASTE MATERIAL

Purchaser may sidecast waste material on side slopes up to 50% if the waste material is compacted and free of organic debris. On side slopes greater than 50%, all waste material must be end hauled or pushed to the designated embankment sites and waste areas identified in Clause 4-37 WASTE AREA LOCATION.

4-37 WASTE AREA LOCATION

Purchaser shall deposit waste material in the listed designated. Additional waste areas may also be identified or approved by the Contract Administrator. The amount of material allowed in a waste area is as listed unless approved by the Contract Administrator.

<u>Road</u>	<u>Waste Area Location</u>	<u>Comments</u>	<u>Volume</u>
MY-ML	4+40 to 6+40	-	1000
MY-ML	83+00 to 86+70	-	2600
MY-ML	92+90 to 94+90	-	1400
MY-ML	103+08 to 105+68	-	1800
MY-ML	112+47 to 114+81	-	1600
MY-ML	132+00 to 133+61	Place below road grade (outside switchback curve)	1100
MY-ML	133+61 to 135+79	Place inside switchback	1500
MY-ML	140+45 to 145+19	-	3500
MY-ML	146+45 to 147+80	-	1000
MY-ML	156+11 to 157+02	-	600
MY-21	3+71 to 5+05		

4-38 PROHIBITED WASTE DISPOSAL AREAS

Purchaser shall not deposit waste material in the following areas, except as otherwise specified in this plan:

- Within 50 feet of a cross drain culvert.
- Within 100 feet of a live stream or wetland.
- On side slopes steeper than 50%.
- In locations that interfere with the construction of the road prism.
- In locations that impede drainage.
- Against standing timber.
- Outside the clearing limits.
- Within a CMZ, see 11-3 CONSTRUCTION WITHIN A CHANNEL MIGRATION ZONE.

4-55 ROAD SHAPING

Purchaser shall shape the subgrade and surface as shown on the TYPICAL SECTION SHEET. The subgrade and surface shape must ensure runoff in an even, un-concentrated manner, and must be uniform, firm, and rut-free.

4-60 FILL COMPACTION

Purchaser shall compact all embankment and waste material by routing equipment over the entire width of each lift.

4-61 SUBGRADE COMPACTION

Purchaser shall compact constructed and reconstructed subgrades by routing equipment over the entire width

4-70 SUBGRADE REINFORCEMENT

On the following road(s), Purchaser shall provide and install geotextile fabric. Subgrade reinforcement must be installed to a width that is 2 feet more than the subgrade width, including turnouts. Geotextile fabric must overlap by a minimum of 2 feet at all joints. The geotextile fabric must be covered with a minimum of 12 inches of compacted 3-inch-minus ballast rock/gravel ballast. Purchaser shall apply rock in one-foot lift(s) over the geotextile in accordance with the manufacturer’s specifications. Geotextile fabric must meet the specifications in Clause 10-3 GEOTEXTILE FOR STABILIZATION.

<u>Road</u>	<u>Stations</u>
MY-ML	55+36 to 56+87
MY-ML	115+72 to 118+45
MY-ML	123+24 to 125+92
MY-ML	197+16 to 200+99
MY-21	18+38 to 20+13
MY-21	22+42 to 24+02
MY-21	25+39 to 28+49
MY-21	33+90 to 38+63
MY-2104	5+81 to 7+83

SECTION 5 – DRAINAGE

5-5 CULVERTS

Purchaser shall install culverts as part of this contract. Culverts must be installed concurrently with subgrade work and must be installed before subgrade compaction and rock application. Culvert locations and the minimum requirements for culvert length and diameter are designated on the MATERIALS LIST. Culvert, downspout, and flume lengths may be adjusted to fit as-built conditions and may not terminate directly on unprotected soil. Culverts may be new or used material and must meet the specifications in Clauses 10-15 through 10-24.

5-7 USED CULVERT MATERIAL

On temporary roads, Purchaser may install used culverts. All other roads must have new culverts installed. Purchaser shall obtain approval from the Contract Administrator for the quality of the used culverts before installation. Culverts must meet the specifications in Clauses 10-15 through 10-24.

5-12 UNUSED MATERIALS STATE PROPERTY

On required roads, any materials listed on the MATERIALS LIST that are not installed will become the property of the state. Purchaser shall stockpile materials as directed by the Contract Administrator.

5-13 CONTINGENCY CULVERTS

The following culverts will be supplied by the Purchaser and are available for installation as directed by the Contract Administrator.

<u>Road</u>	<u>Size</u>	<u>Quantity</u>
On any portion of road used for timber or rock haul.	18" x 36' culvert	4
	18" x 40' culvert	4

5-15 CULVERT INSTALLATION

Culvert installation must be in accordance with the CULVERT AND DRAINAGE SPECIFICATION DETAIL and the National Corrugated Metal Pipe Association's "Installation Manual for Corrugated Steel Drainage Structures" and the Corrugated Polyethylene Pipe Association's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings".

5-16 APPROVAL FOR LARGER CULVERT INSTALLATION

Purchaser shall obtain written approval from the Contract Administrator for the installation of culverts 36 inches in diameter and over before backfilling.

5-17 CROSS DRAIN SKEW AND SLOPE

Cross drains, on road grades in excess of 3%, must be skewed at least 30 degrees from perpendicular to the road centerline, except where the cross drain is at the low point in the road culverts will not be skewed. Cross drain culverts must be installed at a slope steeper than the incoming ditch grade, but not less than 3% or more than 10%.

5-18 CULVERT DEPTH OF COVER

Cross drain culverts must be installed with a depth of cover of not less than 1 foot of compacted subgrade over the top of the culvert at the shallowest point. Stream crossing culverts must be installed with a depth of cover recommended by the culvert manufacturer for the type and size of the pipe.

5-20 ENERGY DISSIPATERS

Purchaser shall install energy dissipaters in accordance with the CULVERT AND DRAINAGE SPECIFICATION DETAIL. Energy dissipater installation is subject to approval by the Contract Administrator.

The type of energy dissipater and the amount of material must be consistent with the specifications listed on the CULVERT AND DRAINAGE SPECIFICATION DETAIL.

5-25 CATCH BASINS

Purchaser shall construct catch basins in accordance with CULVERT AND DRAINAGE SPECIFICATION DETAIL. Minimum dimensions of catch basins are 2 feet wide and 4 feet long.

5-26 HEADWALLS FOR CROSS DRAIN CULVERTS

Purchaser shall construct headwalls in accordance with the CULVERT AND DRAINAGE SPECIFICATION DETAIL at all cross drain culverts. Rock used for headwalls must weigh at least 50 pounds. Rock must be placed on shoulders, slopes, and around culvert inlets and outlets. Minimum specifications require that rock be placed at a width of one culvert diameter on each side of the culvert opening, and to a height of one culvert diameter above the top of the culvert. Rock may not restrict the flow of water into culvert inlets or catch basins. No placement by end dumping or dropping of rock is allowed.

5-27 ARMORING FOR STREAM CROSSING CULVERTS

At the following culvert(s), Purchaser shall place rip rap in conjunction with construction of the embankment. Rock must be placed on shoulders, slopes, and around culvert inlets and outlets as designated on the MATERIALS LIST and CULVERT AND DRAINAGE SPECIFICATIONS or as directed by the Contract Administrator. Rock may not restrict the flow of water into culvert inlets or catch basins. Rock must be set in place by machine. Placement must be with a zero-drop-height only. No placement by end dumping or dropping of rock is allowed. Rip rap must meet the specifications in Clause 6-50 LIGHT LOOSE RIP RAP and 6-50 HEAVY LOOSE RIP RAP

<u>Road</u>	<u>Stations</u>
MY-ML	117+02
MY-ML	124+66
MY-21	27+84
MY-2104-01	1+14
MY-2104-01	5+19

5-31 ROLLING DIP CONSTRUCTION

Purchaser shall construct rolling dips in accordance with the ROLLING DIP DETAIL and as specified on the MATERIALS LIST. Rolling dips must be installed concurrently with construction of the subgrade and must be maintained in an operable condition.

Purchaser shall install rolling dips using a <dozer. Use of other equipment is not allowed without written approval of the Contract Administrator

SECTION 6 – ROCK AND SURFACING

6-2 ROCK SOURCE ON STATE LAND

Rock used in accordance with the quantities on the TYPICAL SECTION and MATERIALS LIST may be obtained from the following source(s) on state land at no charge to the Purchaser. Purchaser shall obtain written approval from the Contract Administrator for the use of material from any other source. If other operators are using, or desire to use the rock source(s), a joint operating plan must be developed. All parties shall follow this plan.

<u>Source</u>	<u>Location</u>	<u>Rock Type</u>
MY-0430 (Proposed)	STA 156+70 of the MY-04 road.	Hard Rock
MY-2100* (Proposed)	STA 1+56 of the MY-21	Hard Rock

*See special requirements for pit development in clause 6-12.

6-5 ROCK FROM COMMERCIAL SOURCE

Rock used in accordance with the quantities on the TYPICAL SECTION and MATERIALS LIST may be obtained from any commercial source at the Purchaser's expense. Rock sources are subject to written approval by the Contract Administrator before their use.

6-11 ROCK SOURCE DEVELOPMENT PLAN BY PURCHASER

Purchaser shall conduct rock source development and use in accordance with a written ROCK SOURCE DEVELOPMENT PLAN to be prepared by the Purchaser. The plan is subject to written approval by the Contract Administrator before any rock source operations. Upon completion of operations, the rock source must be left in the condition specified in the ROCK SOURCE DEVELOPMENT PLAN, and approved in writing by the Contract Administrator.

Rock source development plans prepared by the Purchaser must show the following information:

- Rock source location.
- Rock source overview showing access roads, development areas, stockpile locations, waste areas, and floor drainage.
- Rock source profiles showing development areas, bench locations including widths, and wall faces including heights.

6-12 ROCK SOURCE SPECIFICATIONS

Rock sources must be in accordance with the following specifications:

- Pit walls may not be undermined or over steepened. The maximum slope of the walls must be consistent with recognized engineering standards for the type of material being excavated in accordance with the following table:

Material	Maximum Slope Ratio (Horiz. :Vert.)	Maximum Slope Percent
Sand	2:1	50
Gravel	1.5:1	67
Common Earth	1:1	100
Fractured Rock	0.5:1	200
Solid Rock	0:1	vertical

- Pit walls must be maintained in a condition to minimize the possibility of the walls sliding or failing.
- The width of pit benches must be a minimum of 1.5 times the maximum length of the largest machine used.
- The surface of pit floors and benches must be uniform and free-draining at a minimum 2% outslope gradient.
- All operations must be carried out in compliance with all regulations of the Regulations and Standards Applicable to Metal and Nonmetal Mining and Milling Operations (30 CFR) U.S. Department of Labor, Mine Safety and Health Administration and Safety Standards for Construction Work (296-155 WAC), Washington Department of Labor and Industries.
- All vehicle access to the top of the pit faces must be blocked.

If the Purchaser elects to use the proposed MY-2100 hard rock pit the following requirements must be met:

- Contact all neighbors within 0.5 miles of the pit a minimum of 14 days prior to shooting the pit.
- Stem depth must be a minimum of 6' where possible to cut down on fly rock and noise.

6-14 DRILL AND SHOOT

Rock drilling and shooting must meet the following specifications:

- Purchaser shall notify the Contract Administrator a minimum of 14 working days before blasting operations.
- Purchaser shall block access roads and trails before blasting operations.

6-21 IN-PLACE PROCESSING

On temporary roads and at the following location(s) Purchaser may use in-place processing, such as a grid roller or other method, if suitable crushing can be demonstrated to meet the surfacing size-specified in Clause 6-38 4-INCH IN-PLACE ROCK. Purchaser shall remove any existing organic debris before the start of in-place crushing operations. The use of in-place processing methods is subject to written approval by the Contract Administrator.

<u>Road</u>	<u>Stations</u>	<u>Remarks</u>
MY-ML	STA 174+68 to 179+00	Drill and shoot construction may be necessary.

6-23 ROCK GRADATION TYPES

Purchaser shall provide rock in accordance with the types and amounts listed in the TYPICAL SECTION and MATERIALS LIST. Rock must meet the following specifications for gradation and uniform quality when placed in hauling vehicles or during manufacture and placement into a stockpile. The exact point of evaluation for conformance to specifications will be determined by the Contract Administrator.

6-34 3-INCH MINUS BALLAST ROCK

Ballast rock must be 100% equal to, or smaller than, 3 inches in at least one dimension.

Rock may contain no more than 5 percent organic debris, dirt, and trash. All percentages are by weight.

6-38 4-INCH IN-PLACE ROCK

4-inch in-place rock must have a minimum of 90 percent of the top 4 inches of the running surface pass a 4-inch square opening.

In-place rock may not contain more than 5 percent by weight of organic debris and trash. No more than 5 percent of rock may be larger than 6 inches in any dimension and no rock may be larger than 10 inches in any dimension.

6-50 LIGHT LOOSE RIP RAP

Light loose rip rap must consist of angular, hard, sound, and durable stone. It must be free from segregation, seams, cracks, and other defects tending to destroy its resistance to weather. Light loose rip rap must be free of rock fines, soil, organic debris or other extraneous material, and must meet the following requirements:

<u>Quantity</u>	<u>Approximate Size Range</u>
20% to 90%	500 lbs. to 1 ton (18" - 28")
15% to 80%	50 lbs. to 500 lbs. (8" - 18")
10% to 20%	3 inch to 50 lbs. (3" - 8")

6-51 HEAVY LOOSE RIP RAP

Heavy loose rip rap must consist of angular, hard, sound, and durable stone. It must be free from segregation, seams, cracks, and other defects tending to destroy its resistance to weather. Heavy loose rip rap must be free of rock fines, soil, organic debris or other extraneous material, and must meet the following requirements:

<u>Quantity</u>	<u>Size Range</u>
30% to 90%	1 ton to 2 ton (28" - 36")
30% to 70%	500 lbs. to 1 ton (18" - 28")
20% to 50%	50 lbs. to 500 lbs. (8" - 18")
10% to 20%	3 inch to 50 lbs. (3" - 8")

6-55 ROCK APPLICATION MEASURED BY COMPACTED DEPTH

Measurement of specified rock depths, are defined as the compacted depth(s) using the compaction methods required in this road plan. Estimated quantities specified in the TYPICAL SECTION are loose yards. Purchaser shall apply adequate amounts of rock to meet the specified rock depths. Specified rock depths are minimum requirements, and are not subject to reduction.

6-70 APPROVAL BEFORE ROCK APPLICATION

Purchaser shall obtain written approval from the Contract Administrator for culvert installation, ditch construction, ditch reconstruction, headwall construction, and headwall reconstruction before rock application.

6-71 ROCK APPLICATION

Purchaser shall apply rock in accordance with the specifications and quantities shown on the TYPICAL SECTION. Rock must be spread, shaped, and compacted full width concurrent with rock hauling operations. The Contract Administrator will direct locations for rock that is to be applied as spot patching. Road surfaces must be compacted in accordance with the TYPICAL SECTION by routing equipment over the entire width.

6-73 ROCK FOR WIDENED PORTIONS

Purchaser shall apply rock to turnarounds, turnouts, and areas with curve widening to the same depth and specifications as the traveled way.

6-80 WATERING FOR DUST ABATEMENT

Purchaser shall use water for dust abatement on the following roads, as directed by the Contract Administrator.

<u>Road</u>	<u>Stations</u>
MY-ML	0+00 to 234+31
MY-04	0+00 to 156+70

SECTION 7 – STRUCTURES

7-6 STREAM CROSSING INSTALLATION

Purchaser shall install stream crossing structures in accordance with the manufacturer's requirements, and specifications, Riparian Forest Restoration Strategy, requirements of the FPHP, and the bridge installation details on sheets 60-77.

7-16 DRAWING AND CALCULATION REVIEW FOR ACCEPTANCE

Purchaser shall prepare and submit three sets of complete design drawings and calculations for the superstructure and substructure including footings, foundation and bank protection. All drawings and calculations must be prepared, stamped, and signed by a Registered Professional Engineer licensed in the State of Washington. The superstructure must be designed by a Professional Engineer licensed in the state of manufacture. Drawings can be in either electronic or hard copy form and must be no smaller than 11" X 17" sheets.

Bridge super structure design must include all shop detail plans for fabricating the steel. All welds and splices must be shown on the shop plans. No welded field splices will be allowed; all field splices must be bolted and explicitly designed. No welded splices will be allowed on girders, floor beams, or truss members without specific approval from the Region Engineer or designee. When used, shop splices are generally complete joint penetration (CIP) butt-welded splices that develop the full section strength of the adjoining materials. In general, splices must not be made for material lengths or spans under 60 feet, or for widths or depths under 12.5 feet, unless the Purchaser demonstrates that the material is not otherwise readily and commercially available.

Send submittals to:

Department of Natural Resources
Attn.: Tamra Zylstra
919 N Township St.
Sedro Woolley, WA 98284
360-854-2807
tamra.zylstra@dnr.wa.gov

Reports and plans will be accepted or rejected within 30 working days of receipt. Delays in work because of the possibility of rejection, revision, and resubmittal of documents are deemed a risk of the Purchaser and may not be the basis for claims of additional compensation.

Materials may not be fabricated until the Region Engineer or designee has approved the plans. Changes are not allowed in any shop plan after approval unless approved in writing by the Region Engineer or designee.

7-17 STRUCTURE ACCEPTANCE

The Region Engineer or designee will inspect the structure upon delivery. Acceptance will be issued if the structure meets all specifications and certifications. Structures that are not accepted may not be installed.

7-18 INSTALLATION PRODUCTION SCHEDULE

Purchaser shall provide the Contract Administrator or their designee, with a production schedule showing projected completion dates for the following items before starting construction of the structure(s). Production schedule must include:

- excavation
- placement of sills/abutments/footings/structure
- backfill compaction, rock application and compaction

7-19 INSTALLATION STAGE ACCEPTANCE

Purchaser shall ensure that all materials and procedures used during construction comply with the design. Purchaser shall obtain written approval from the Contract Administrator or their designee, after verification by the Region Engineer or designee for each stage of construction, listed in Clause 7-18 INSTALLATION PRODUCTION SCHEDULE, before starting construction on the next stage. Purchaser shall notify the Contract Administrator in writing when each construction stage is complete.

7-20 INSTALLATION FINAL ACCEPTANCE

Purchaser shall notify the Contract Administrator in writing when each structure is complete. Within 15 working days of final construction acceptance, Purchaser shall submit two complete sets of finalized plans to the Region Engineer and one to the Contract Administrator. Any omissions to the plans are the responsibility of the Purchaser to correct and include in the finalized set of plans. Submit finalized plans to the same location stated in Clause 7-15 DRAWING AND CALCULATION REVIEW FOR ACCEPTANCE.

7-45 PURCHASER SUPPLIED BRIDGE

Purchaser shall provide, and construct each bridge listed below. Refer to Technical Bridge Specifications and design sheets for details.

Road	Station	Length (ft)	W.B.S.R. ¹ (ft)	Bridge Type	Footing / Abutment	Running Surface
MY-ML	54+10 to 54+88	78	14	Modular Steel	Spread Footings	Gravel or Concrete
MY-ML	72+11 to 72+71	60	14	Modular Steel	(1) Spread Footing, and (1) Tower and Pad	Gravel or Concrete
MY-ML	97+53 to 97+68	15	16	Concrete Slab	Spread Footing on Precast Block Wall	Concrete

¹W.B.S.R. = Width between shear rails.

7-46 STATE SUPPLIED BRIDGE

Purchaser shall deliver and construct each bridge listed below. Bridge(s) are available for use within the terms of the contract without charge from the state.

Road	Station	Length (ft)	W.B.S.R. ¹ (ft)	Bridge Type	Footing / Abutment	Running Surface
MY-ML	61+85 to 62+35	50	16	Modular Steel	Spread Footings	Gravel
MY-21 ²	6+92 to 7+42	50	14	Modular Steel	Spread Footings	Wood Plank

¹W.B.S.R. = Width between shear rails

²This structure may also be used for the temporary crossing during construction of bridge at 54+10 of MY-ML.

7-47 PURCHASER SUPPLIED FOOTINGS

Purchaser shall provide footing designs. Bridge footings must be designed by an engineer licensed in the state or province of manufacture.

7-48 STATE SUPPLIED BRIDGE – MOBILIZATION

Purchaser is responsible for all costs associated with loading and transportation of State supplied bridges. Equipment used to lift the superstructure must have sufficient capacity to lift it free and clear without dragging. Purchaser is liable for damage to the bridge structure.

The bridges and precast spread footings are stored behind a locked gate at a location approximately two miles north of Hamilton, WA (refer to vicinity map for details). Rail posts, guardrail, backwalls, and other miscellaneous hardware are stored at the Northwest Region office in Sedro Woolley, WA.

Purchaser shall notify the Contract Administrator a minimum of 2 business days before pick up of the bridge and associated hardware.

Road	Station	Length (ft)	Bridge Sections	Section Weight (lbs)	Precast Sill Weight (lbs)	Type
MY-ML	61+85 to 62+35	50	2	15,480	11,250	BigR
MY-21	6+92 to 7+42	50	2	18,210	10,130	BigR

7-52 TECHNICAL SPECIFICATIONS

The bridge superstructure design, fabrication, and welding must be in accordance with the TECHNICAL BRIDGE SPECIFICATIONS on sheets 78-81.

7-53 BRIDGE INSTALLATION

Purchaser shall install bridges ensuring there is a full width, continuous deck with no gaps that allow water and sediment to drain from the bridge to the stream.

7-76 GATE INSTALLATION

On the following road(s), Purchaser shall install the designated gate(s). Gate installations shall be installed within 7 days of bridge installation.

<u>Road</u>	<u>Station</u>	<u>Type*</u>	<u>Furnished by</u>
MY-ML	54+06	Steel Gate	State

* Steel gate installation(s) shall be in accordance with the STEEL GATE DETAIL.

The gate and lock box shall be installed plumb and aligned to ensure all mating components match with precision. Each post shall be filled with concrete and set in a minimum of 4 cubic yards of poured-in-place concrete. The Contract Administrator will supply the Purchaser with a padlock. If the Purchaser wishes to install an alternate design, detailed plans for the construction of the gate shall be submitted to the Contract Administrator, or their designee, for approval, in writing, before gate installation.

7-77 GATE SUPPLIED BY STATE

A gate with lock box is located at NW Region Office. After arranging with the Contract Administrator, Purchaser shall transport the gate, tie-back post, and lock box to the installation site. Notification to Region Engineer is required 24-48 hours in advance of pickup.

SECTION 8 – EROSION CONTROL

8-2 PROTECTION FOR EXPOSED SOIL

Purchaser shall provide and evenly spread a 4-inch layer of straw to all exposed soils at culvert installations. Soils must be covered before the first anticipated storm event. Soils may not sit exposed during any rain event.

8-3 EROSION CONTROL MATTING

On the following road(s), Purchaser shall install biodegradable erosion control matting to provide full coverage of the disturbed area. Matting must be either natural fiber matting made of jute or coconut, or an erosion control blanket made of wood excelsior. Erosion control matting must conform to the specifications listed in Clause 10-10 JUTE EROSION CONTROL MATTING or 10-11 COCONUT EROSION CONTROL MATTING or 10-12 WOOD EXCELSIOR EROSION CONTROL MATTING. Installation must be in accordance with the manufacturer's recommendations.

<u>Road</u>	<u>Stations</u>	<u>Remarks</u>
MY-ML	54+10 to 54+88	Place erosion control matting on temporary bridge access adjacent to bridge installation.

8-5 CHECK DAM

On the following road(s), Purchaser shall construct rock check dams every 2 vertical feet in the ditch. Check dams must be built with 3-inch minus crushed rock to a depth of 8 inches and a length of 4 feet.

<u>Road</u>	<u>Stations</u>
MY-ML	61+58 to 61+85

8-10 STABILIZE SLOPES – ROCK APPLICATION

On the following road(s), Purchaser shall stabilize embankment (fill) slopes by applying rock as specified below. Rock must be set in place in conjunction with or immediately following construction of the embankment. Rock must be applied in quantities specified in the MATERIALS LIST to exposed soil on the entire embankment to a minimum depth 24 inches. Rock must be set in place by machine. Placement must be with a zero-drop-height only. No placement by end dumping or dropping of rock is allowed.

<u>Road</u>	<u>Stations</u>
MY-ML	160+53 to 162+02

8-15 REVEGETATION

Purchaser shall spread seed and fertilizer on all exposed soils within the grubbing limits resulting from road work activities. Cover all exposed soils using manual dispersal of grass seed and fertilizer. Other methods of covering must be approved in writing by the Contract Administrator.

8-16 REVEGETATION SUPPLY

The Purchaser shall provide the grass seed and fertilizer as directed in clauses 8-25 GRASS SEED, 8-26 GRASS SEED: WETLAND MANAGEMENT MIX, and 8-27 FERTILIZER.

8-17 REVEGETATION TIMING

Purchaser shall revegetate during the first available opportunity after road work is completed. Soils may not be allowed to sit exposed for longer than one month without receiving revegetation treatment unless otherwise approved in writing by the Contract Administrator.

8-18 PROTECTION FOR SEED

Purchaser shall provide a protective cover for seed if revegetation occurs between July 1 and March 31. The protective cover may consist of dispersed straw, jute matting, or clear plastic sheets. The protective cover requirement may be waived in writing by the Contract Administrator if Purchaser is able to demonstrate a revegetation plan that will result in the establishment of a uniform dense crop (at least 50% coverage) of 3-inch tall grass by October 31.

8-19 ASSURANCE FOR SEEDED AREA

Purchaser shall ensure the growth of a uniform and dense crop (at least 50% coverage) of 3-inch tall grass. Purchaser shall reapply the grass seed and fertilizer in areas that have failed to germinate or have been damaged through any cause. Restore eroded or disturbed areas, clean up and properly dispose of eroded materials, and reapply the seed and fertilizer at no additional cost to the state.

8-25 GRASS SEED

Except as specified in clause 8-26 GRASS SEED: WETLAND MANAGEMENT MIX, Purchaser shall evenly spread the seed mixture listed below on all exposed soil inside the grubbing limits at a rate of 50 pounds per acre of exposed soil. Grass seed must meet the following specifications:

1. Weed seed may not exceed 0.5% by weight.
2. All seed species must have a minimum 90% germination rate, unless otherwise specified.
3. Seed must be certified.
4. Seed must be furnished in standard containers showing the following information:
 - a. Common name of seed
 - b. Net weight
 - c. Percent of purity
 - d. Percentage of germination
 - e. Percentage of weed seed and inert material
5. Seed must conform to the following mixture unless a comparable mix is approved in writing by the Contract Administrator.

<u>Kind and Variety of Seed in Mixture</u>	<u>% by Weight</u>
Creeping Red Fescue	50
Elf Perennial Rye Grass	25
Highland Colonial Bentgrass	15
White Clover	10
Inert and Other Crop	0.5

8-26 GRASS SEED: WETLAND MANAGEMENT MIX

On the following roads, located in proximity to a Wetland Management Zone, a Wetland Management seed mixture shall be used instead of the mixture listed in 8-25 GRASS SEED.

<u>Road</u>	<u>Stations</u>
MY-21	STA 23+63 to 34+82
MY-2106	STA 0+00 to 4+73

Purchaser shall evenly spread the Wetland Management seed mixture listed below on all exposed soil inside the grubbing limits at a rate of 50 pounds per acre of exposed soil. Grass seed shall meet the following specifications:

1. Weed seed shall not exceed 0.5% by weight.
2. All seed species shall have a minimum 90% germination rate, unless otherwise specified.
3. Seed shall be certified.
4. Seed shall be furnished in standard containers that show the following information:
 - a. Common name of seed
 - b. Net weight
 - c. Percent of purity
 - d. Percentage of germination
 - e. Percentage of weed seed and inert material
5. Seed shall conform to the following mixture.

<u>Kind and Variety of Seed in Mixture</u>	<u>% by Weight</u>
Annual Rye Grass	40
Winter triticale	40
Perennial Rye Grass	10
Austrian winter pea (inoculated)	10

Do not use seed sources that have the label "other seeds" - these can contain invasive species.

Mulch with straw to achieve no more than 70% cover, evenly distributed, at a rate of 1.5 to 2 tons per acre.

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8-27 FERTILIZER

Purchaser shall evenly spread the fertilizer listed below on all exposed soil inside the grubbing limits at a rate of 200 pounds per acre of exposed soil. Fertilizer must meet the following specifications:

<u>Chemical Component</u>	<u>% by Weight</u>
Nitrogen	16
Phosphorous	16
Potassium	16
Sulphur	3
Inerts	49

SECTION 9 – POST-HAUL ROAD WORK

9-3 CULVERT MATERIAL REMOVED FROM STATE LAND

Culverts removed from roads become the property of the Purchaser and must be removed from state land.

9-5 POST-HAUL MAINTENANCE

Purchaser shall perform post-haul maintenance in accordance with the FOREST ACCESS ROAD MAINTENANCE SPECIFICATIONS.

9-10 LANDING DRAINAGE

Purchaser shall provide for drainage of the landing surface.

9-21 ROAD ABANDONMENT

Purchaser shall abandon the following before the termination of this contract or by the specified date.

<u>Road</u>	<u>Stations</u>	<u>Type</u>	<u>Date</u>
MY-12	0+00 to 6+69	HEAVY ABANDONMENT	Road may not overwinter more than one season. Abandonment must be completed within 60 days of timber removal from Unit 3.
MY-12	6+69 to 10+09	ABANDONMENT	-
MY-RRG15	0+00 to 31+40	ABANDONMENT*	
MY-2104	0+00 to 11+91	ABANDONMENT	-
MY-2104-01	0+00 to 2+26, 3+98 to 8+11	ABANDONMENT	-
MY-2104-01	2+26 to 3+98	HEAVY ABANDONMENT	-
MY-2106	0+00 to 16+53	ABANDONMENT	-
MY-43	0+00 to 9+40	ABANDONMENT	-

*The required work is located on an orphaned grade.

9-22 ABANDONMENT

- Remove all ditch relief culverts. The resulting slopes must be 1:1 or flatter. Place and compact the removed fill material in a location that will not erode into any Type 1 through 5 waters or wetlands.
- Remove all culverts in natural drainages. The resulting slopes must be 1.5:1 or flatter. Strive to match the existing native stream bank gradient. The natural streambed width must be re-established. Place and compact the removed fill material in a location that will not erode into any Type 1 through 5 waters or wetlands.
- Transport all removed culverts off site. All removed culverts are the property of the Purchaser.
- Construct non-drivable waterbars at natural drainage points and at a spacing that will produce a vertical drop of no more than 20 feet between waterbars and with a maximum horizontal spacing of 400 feet.
- Skew waterbars at least 30 degrees from perpendicular to the road centerline on roads in excess of 3 percent grade.
- Key waterbars into the cut-slope to intercept the ditch. Waterbars must be outsloped to provide positive drainage. Outlets must be on stable locations.
- Inslope or outslope the road as appropriate.
- Remove bridges and other structures.
- Pull back unstable fill that has potential of failing and entering any Type 1 through 5 waters or wetlands. Place and compact removed material in a stable location.
- Remove berms except as designed.
- Block the road by constructing an aggressive barrier of dense interlocked large woody debris (logs, stumps, root wads, etc.) so that four wheel highway vehicles cannot pass the point of abandonment. Typical barrier dimensions are 10 feet high by 20 feet deep, spanning the entire road prism from top of cutslope to toe of fillslope. Long term effectiveness is the primary objective. If necessary construct a vehicular turn-around near the point of abandonment.
- Apply grass seed to all exposed soils resulting from the abandonment work and in accordance with Section 8 EROSION CONTROL.

9-24 HEAVY ABANDONMENT

In addition to requirements listed in 9-22 ABANDONMENT the purchaser shall complete the following abandonment items to meet hydrologic goals in proximity to RMZs and WMZs or hydrologic goals within a channel migration zone:

- Complete an on-site pre-work with the Contract Administrator and Forest Practices prior to beginning abandonment work.
- Remove embankments, sidecast fill, and place material into cut-banks and shape banks to conform to the natural ground.
- Pull back entire road prism from swales as listed in clause 11-3 CONSTRUCTION WITHIN A CHANNEL MIGRATION ZONE and place within full bench road cuts or against the side walls of each swale.
- Scatter woody debris onto re-shaped abandoned road surfaces.

SECTION 10 MATERIALS

10-3 GEOTEXTILE FOR STABILIZATION

Geotextiles must meet the following minimum requirements for strength and property qualities, and must be designed by the manufacturer to be used for stabilization or reinforcement, and filtration. Material must be free of defects, cuts, and tears.

	<u>ASTM Test</u>	<u>Requirements</u>
Type	--	Woven
Apparent opening size	D 4751	No. 40 max
Water permittivity	D 4491	0.10 sec ⁻¹
Grab tensile strength	D 4632	315 lb
Grab tensile elongation	D 4632	50%
Puncture strength	D 6241	620 lb
Tear strength	D 4533	112 lb
Ultraviolet stability	D 4355	50% retained after 500 hours of exposure

10-10 JUTE EROSION CONTROL MATTING

Jute mesh must have a uniform open plain weave made from jute yarn that does not vary by more than half its nominal diameter. Erosion control matting must conform to the specifications listed below, and must be recommended by the manufacturer for use on embankments with a slope of 1½:1 (H:V) or steeper.

- Mesh size 1 inch max.
- Mesh mass, 0.9 lb/yd² ±5%

10-11 COCONUT EROSION CONTROL MATTING

Coconut mat must have a uniform open plain weave made from jute, coconut coir, synthetic polypropylene fibers, or other approved yarn. Erosion control matting must conform to the specifications listed below, and must be recommended by the manufacturer for use on embankments with a slope of 1½:1 (H:V) or steeper.

- Mesh size 0.5 to 1 inch.
- Mesh mass, 0.4 lb/yd² min.
- Netting must be photodegradable on one side.
- Moisture content may not exceed 20%.

10-12 WOOD EXCELSIOR EROSION CONTROL MATTING

Excelsior blanket must have a uniform thickness made of curled wood excelsior secured on the top side to a biodegradable, photodegradable extruded plastic mesh. Matting must be smolder resistant without the use of additional chemical additives. Erosion control matting must conform to the specifications listed below, and must be recommended by the manufacturer for use on embankments with a slope of 1½:1 (H:V) or steeper.

- Mesh size 1 to 2 inch.
- Blanket mass, 1 lb/yd² ±10%
- Excelsior fibers 7.8 inch (200-mm) length 80% min.

10-15 CORRUGATED STEEL CULVERT

Metallic coated steel culverts must meet AASHTO M-36 (ASTM A-760) specifications. Culverts must be galvanized (zinc coated meeting AASHTO M-218).

10-16 CORRUGATED ALUMINUM CULVERT

Aluminum culverts must meet AASHTO M-196 (ASTM A-745) specifications.

10-17 CORRUGATED PLASTIC CULVERT

Polyethylene culverts must meet AASHTO M-294 specifications, or ASTM F-2648 specifications for recycled polyethylene. Culverts must be Type S – double walled with a corrugated exterior and smooth interior.

10-21 METAL BAND

Metal coupling and end bands must meet the AASHTO specification designated for the culvert and must have matching corrugations. Culverts 24 inches and smaller must have bands with a minimum width of 12 inches. Culverts over 24 inches must have bands with a minimum width of 24 inches.

10-22 PLASTIC BAND

Plastic coupling and end bands must meet the AASHTO specification designated for the culvert. Only fittings supplied or recommended by the culvert manufacturer may be used.

10-24 GAUGE AND CORRUGATION

Unless otherwise stated in the engineer’s design, metal culverts must conform to the following specifications for gage and corrugation as a function of diameter.

<u>Diameter</u>	<u>Gage</u>	<u>Corrugation</u>
18"	16 (0.064")	2 2/3" X 1/2"
24" to 48"	14 (0.079")	2 2/3" X 1/2"
54" to 96"	14 (0.079")	3" X 1"

SECTION 11 SPECIAL NOTES

11-1 OPERATIONS AT FISH BEARING STREAMS

Purchaser shall develop a site specific Spill Prevention and Erosion Control Plan to be approved by the Contract Administrator prior to structure installation at the following bridge installation sites:

<u>Road</u>	<u>Structure Location</u>	<u>Structure Type</u>
MY-ML	STA 54+10 to 54+88	BRIDGE
MY-ML	STA 61+85 to 62+35	BRIDGE
MY-ML	STA 72+11 to 72+71	BRIDGE
MY-ML	STA 97+53 to 97+68	BRIDGE
MY-21	STA 6+92 to 7+42	BRIDGE

If it is necessary to pass equipment over open water prior to bridge structure installation at the locations listed above then this shall be addressed in the Erosion Control Plan. Equipment may pass over open water only if the drive mechanisms do not enter the channel.

11-2 PROTECTION OF FISH DURING STRUCTURE INSTALLATION

Best Management Practices for the protection of fish life and habitat shall be applied as described in the Forest Practices Board Manual Section 5 GUIDELINES FOR FOREST PRACTICES HYDRAULIC PROJECTS. All structure installation sites listed in 11-1 shall be either dewatered or have fish exclusion measures in place prior to installation.

Dewatering methods must be approved by the contract administrator which may include:

- Passive gravity flow bypass consistent with WAC 222-24-044
- Cofferdam and pump(s) equipped with screens to prevent injury of fish pursuant to RCW 77.57.010 and RCW 77.57.070.
- Isolation of water from work area

The purchaser shall maintain clean water by diverting the stream before it enters the construction site and returning the flow to the channel downstream from the project. Any water that appears within the installation area shall be captured and removed from the construction site. This wastewater may not be discharged directly into typed waters. Fish stranded in the bypass reach shall be safely removed to the flowing stream.

Where dewatering will not be used fish shall be excluded from the construction site in accordance with the Forest Practices Board Manual Chapter 5, Section 9 Fish Capture and Exclusion.

11-3 CONSTRUCTION WITHIN CHANNEL MIGRATION ZONE

On the following roads proposed within a channel migration zone, the typical section shall be constructed with an outsloped road surface of 3% without a ditch. Road work shall be completed with the goal of maintaining natural drainages:

<u>Road</u>	<u>Stations</u>
MY-ML	62+35 to 71+00
MY-12	0+00 to 7+08

Within swale locations listed below the maximum embankment (fill) depth permitted at centerline is 2.0 feet and must be removed during abandonment (see clause 9-24 HEAVY ABANDONMENT). The purchaser shall also construct rolling dips as listed in the MATERIALS LIST and in accordance with the ROLLING DIP DETAIL.

<u>Road</u>	<u>Stations</u>
MY-ML	63+70 to 65+70
MY-12	0+89 to 1+42
MY-12	2+59 to 3+27
MY-12	4+10 to 4+62
MY-12	5+20 to 5+70

11-4 STREAM BANK RESTORATION

On the following road Purchaser shall perform work as directed in the STREAM BANK RESTORATION DETAIL.

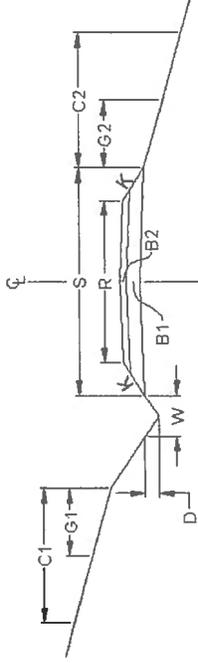
<u>Road</u>	<u>Stations</u>
MY-RRG15	30+40 to 31+40

This work entails pulling back a poorly located orphaned grade embankment at a Type 4 stream crossing to reduce the risk of an avulsion hazard. Material removed from the channel shall be placed on the grade and shaped to mimic the natural bank above and below the orphaned grade. Additional material is available on site with written approval from the Contract Administrator. All work must be completed under the direction of a State Lands Geologist and District Engineer with approval by Forest Practices and WDFW.

ROAD #	MY-ML REQUIRED					
REQUIRED / OPTIONAL	MAINTENANCE	RECONSTRUCT	RECONSTRUCT	RECONSTRUCT	RECONSTRUCT	RECONSTRUCT
CONSTRUCT / RECONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT
TOLERANCE CLASS (A/B/C)	C	C	C	C	C	C
STATION / MP TO	0+00	20+30	54+10	54+88	54+88	54+88
STATION / MP	20+30	54+10	54+88	61+85	61+85	61+85
ROAD WIDTH	-	12	14	12	12	12
CROWN (INCHES @ C/L)	-	3	3	3	3	3
DITCH WIDTH	-	3	3	3	3	3
DITCH DEPTH	-	1	1	1	1	1
TURNOUT LENGTH	-	50	50	50	50	50
TURNOUT WIDTH	-	10	10	10	10	10
TURNOUT TAPER	-	25	25	25	25	25
GRUBBING	-	5	5	5	5	5
CLEARING	-	10	10	10	10	10
ROCK FILLSLOPE	-	10	10	10	10	10
❖ BALLAST DEPTH	-	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
CUBIC YARDS / STATION	-	6	6	6	6	6
> TOTAL CY BALLAST	-	34	34	34	34	34
❖ SURFACING DEPTH	-	2450*	2450*	2450*	2450*	2450*
CUBIC YARDS / STATION	-	-	-	-	-	-
> TOTAL CY SURFACING	-	-	-	-	-	-
> TOTAL CUBIC YARDS	-	2450*	2450*	2450*	2450*	2450*
SUBGRADE WIDTH	-	-	-	-	-	-
BRUSHCUT (Y/N)	Y	N	N/A	N/A	N/A	N/A
BLADE, SHAPE, & DITCH (Y/N)	N	Y**	N/A	N/A	N/A	N/A

78 FOOT SPAN, GRAVEL DECK, PRE-CONSTRUCTED, MODULAR TYPE, PAINTED STEEL BRIDGE AND PRE-CAST CONCRETE FOOTINGS

TYPICAL SECTION



TURNOUT DETAIL (PLAN VIEW)



SYMBOL NOTES

- ❖ Specified Rock Depth is FINISHED COMPACTED DEPTH in inches.
- > Specified Rock Quantity is LOOSE MEASURE (Truck Cubic Yards) needed to accomplish specified FINISHED COMPACTED DEPTH. Rock quantities include volume for turnouts, curve widening and landings.

* Quantity includes 1300 cubic yards of shot rock for road prism reconstruction and 1150 cubic yards 3-inch-minus ballast rock.
 ** Pull berms back into road subgrade prior to shot rock application.
 A 3-inch-minus ballast for bridge approach.
 B 1 1/2-inch-minus crushed rock from a commercial source for bridge surfacing and a leveling course for precast concrete footings. See installation details on pages 45-50.
 C New construction is located on an existing grade.

Rock Totals Summary

Type	Quantity (Cubic Yards)
Ballast	28,560
Rip Rap	1555
1 1/2" minus	150
Shot rock	1300

ROAD #	MY-ML REQUIRED										
REQUIRED / OPTIONAL	CONSTRUCT										
CONSTRUCT / RECONSTRUCT	CONSTRUCT										
TOLERANCE CLASS (A/B/C)	A	C	C	A	C	C	A	C	C	C	C
STATION / MP TO	61+85	62+35	67+33	72+11	72+71	72+71	72+11	81+64	86+57	94+27	94+27
STATION / MP	62+35	67+33	72+11	72+71	81+64	86+57	72+71	86+57	94+27	97+53	97+53
ROAD WIDTH	16	12	12	14	12	12	14	12	12	12	12
CROWN (INCHES @ C/L)		3	3		3	3		3	3	3	3
DITCH WIDTH		3	3		3	3		3	3	3	3
DITCH DEPTH		1	1		1	1		1	1	1	1
TURNOUT LENGTH		50	50		50	50		50	50	50	50
TURNOUT WIDTH		10	10		10	10		10	10	10	10
TURNOUT TAPER		25	25		25	25		25	25	25	25
GRUBBING		5	5		5	5		5	5	5	5
		5	5		5	5		5	5	5	5
CLEARING		10	10		10	10		10	10	10	10
		10	10		10	10		10	10	10	10
ROCK FILLSLOPE		1 1/2	1 1/2		1 1/2	1 1/2		1 1/2	1 1/2	1 1/2	1 1/2
❖ BALLAST DEPTH		18	12		12	12		18	12	18	18
CUBIC YARDS / STATION		114	72		72	72		114	72	114	114
> TOTAL CY BALLAST	20 ^A	580	350	20 ^A	650	650	20 ^A	570	560	380	380
❖ SURFACING DEPTH		-	-		-	-		-	-	-	-
CUBIC YARDS / STATION		-	-		-	-		-	-	-	-
> TOTAL CY SURFACING	40 ^B	-	-	20 ^B	-	-	20 ^B	-	-	-	-
> TOTAL CUBIC YARDS	60	580	350	40	650	650	40	570	560	380	380
SUBGRADE WIDTH		16.5	15		15	15		16.5	15	16.5	16.5
BRUSHCUT (Y/N)	N/A										
BLADE, SHAPE, & DITCH (Y/N)	N/A										

60 FOOT SPAN, GRAVEL DECK, PRE-CONSTRUCTED, MODULAR TYPE STEEL BRIDGE AND PRECAST CONCRETE FOOTING WITH STEEL TOWER ASSEMBLY

50 FOOT SPAN, GRAVEL DECK, PRE-CONSTRUCTED, MODULAR TYPE, PAINTED STEEL BRIDGE AND PRE-CAST CONCRETE FOOTINGS

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ROAD #	MY-ML REQUIRED	MY-ML REQUIRED	MY-ML ^c REQUIRED	MY-ML REQUIRED	MY-04 REQUIRED	MY-12 OPTIONAL	MY-21 REQUIRED	MY-21 REQUIRED
REQUIRED / OPTIONAL	CONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	MAINTENANCE	CONSTRUCTION	CONSTRUCT	CONSTRUCT
CONSTRUCT / RECONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	MAINTENANCE	CONSTRUCTION	CONSTRUCT	CONSTRUCT
TOLERANCE CLASS (A/B/C)	A	C	C	C	C	C	C	C
STATION / MP TO	97+53	97+68	182+56	185+17	0+00	0+00	0+00	6+92
STATION / MP	97+68	182+56	185+17	234+31	156+70	10+09	6+92	7+42
ROAD WIDTH	16	12	12	12	-	12	12	14
CROWN (INCHES @ C/L)		3	3	3	-	3	3	
DITCH WIDTH		3	3	3	-	2	3	
DITCH DEPTH		1	1	1	-	1	1	
TURNOUT LENGTH		50	50	50	-	25	50	
TURNOUT WIDTH		10	10	10	-	10	10	
TURNOUT TAPER		25	25	25	-	25	25	
GRUBBING		5	5	5	-	5	5	
		5	5	5	-	5	5	
CLEARING		10	10	10	-	10	10	
		10	10	10	-	10	10	
ROCK FILLSLOPE		1 1/2	1 1/2	1 1/2	-	1 1/2	1 1/2	
❖ BALLAST DEPTH	-	18	12	18	-	12	18	
CUBIC YARDS / STATION	-	114	72	114	-	72	114	
➤ TOTAL CY BALLAST	-	9700	190	5,610	-	730	560	
❖ SURFACING DEPTH	-	-	-	-	-	-	-	
CUBIC YARDS / STATION	-	-	-	-	-	-	-	
➤ TOTAL CY SURFACING	20 ^B	-	-	-	-	-	-	20 ^B
➤ TOTAL CUBIC YARDS	20 ^B	9700	190	5,610	-	730	560	20 ^B
SUBGRADE WIDTH	-	16.5	15.0	16.5	-	15.0	16.5	
BRUSHCUT (Y/N)	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A
BLADE, SHAPE, & DITCH (Y/N)	N/A	N/A	N/A	N/A	N	N/A	N/A	N/A
50 FOOT SPAN, WOOD DECK PRE-CONSTRUCTED, MODULAR TYPE, PAINTED STEEL BRIDGE AND PRE-CAST CONCRETE FOOTINGS								

ROAD #	MY-21	MY-2104	MY-2104-01	MY-2106	MY-43
REQUIRED / OPTIONAL	REQUIRED	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
CONSTRUCT / RECONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT
TOLERANCE CLASS (A/B/C)	C	C	C	C	C
STATION / MP TO	7+42	0+00	0+00	0+00	0+00
STATION / MP	39+76	11+91	8+11	16+53	9+40
ROAD WIDTH	12	12	12	12	12
CROWN (INCHES @ C/L)	3	3	3	3	3
DITCH WIDTH	3	2	2	2	2
DITCH DEPTH	1	1	1	1	1
TURNOUT LENGTH	50	25	25	25	25
TURNOUT WIDTH	10	10	10	10	10
TURNOUT TAPER	25	25	25	25	25
GRUBBING	5	5	5	5	5
	5	5	5	5	5
CLEARING	10	10	10	10	10
	10	10	10	10	10
ROCK FILLSLOPE	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
❖ BALLAST DEPTH	18	12	12	12	6
CUBIC YARDS / STATION	114	72	72	72	34
➤ TOTAL CY BALLAST	3700	860	590	1200	320
❖ SURFACING DEPTH	-	-	-	-	-
CUBIC YARDS / STATION	-	-	-	-	-
➤ TOTAL CY SURFACING	-	-	-	-	-
➤ TOTAL CUBIC YARDS	3700	860	590	1200	320
SUBGRADE WIDTH	16.5	15	15	15	13.5
BRUSHCUT (Y/N)	N/A	N/A	N/A	N/A	N/A
BLADE, SHAPE, & DITCH (Y/N)	N/A	N/A	N/A	N/A	N/A

MATERIALS LIST

LOCATION	STATION	CULVERT			DWNSPT		RIPRAP			FILL TYPE	TOLERANCE	REMARKS												
		DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE															
MY-ML	23+30	18	34	XX			2	3	L	NT	C	<p>Note: Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:</p> <table border="1"> <tr> <td><u>Diameter</u></td> <td><u>Gage</u></td> <td><u>Corrugation</u></td> </tr> <tr> <td>18"</td> <td>16</td> <td>2 2/3" x 1/2"</td> </tr> <tr> <td>24" - 48"</td> <td>14</td> <td>2 2/3" x 1/2"</td> </tr> <tr> <td>54" - 96"</td> <td>14</td> <td>3" x 1"</td> </tr> </table>	<u>Diameter</u>	<u>Gage</u>	<u>Corrugation</u>	18"	16	2 2/3" x 1/2"	24" - 48"	14	2 2/3" x 1/2"	54" - 96"	14	3" x 1"
<u>Diameter</u>	<u>Gage</u>	<u>Corrugation</u>																						
18"	16	2 2/3" x 1/2"																						
24" - 48"	14	2 2/3" x 1/2"																						
54" - 96"	14	3" x 1"																						
	26+30	18	34	XX			2	3	L	NT	C													
	29+05	18	34	XX			2	3	L	NT	C													
	30+90	18	34	XX			2	3	L	NT	C													
	35+50	18	34	XX			2	3	L	NT	C													
	38+50	18	34	XX			2	3	L	NT	C													
	39+90	18	34	XX			2	3	L	NT	C													
	41+10	18	34	XX			2	3	L	NT	C													
	42+50	18	34	XX			2	3	L	NT	C													
	47+20	18	34	XX			2	3	L	NT	C													
	52+30	18	34	XX			2	3	L	NT	C													
	54+07	-	-	-	-	-	-	-	-	-	-	Install steel gate. See 7-76 GATE INSTALLATION and STEEL GATE DETAIL												
	54+10 to 54+88	78 FOOT SPAN, PRE-CONSTRUCTED, MODULAR TYPE, PAINTED STEEL BRIDGE AND PRE-CAST CONCRETE FOOTINGS				50			O/H /L	NT	A	See clauses 11.1, 11.2 and DETAILS for BRIDGE SITE #1.												
	55+36	-	-	-	-	-	-	-	-	-	-	Start geotextile.												
	56+87	-	-	-	-	-	-	-	-	-	-	End geotextile.												
	57+10	-	-	-	-	-	-	-	-	-	-	Ditchout												
	57+61	18	30	XX			2	3	L	NT	C													
	58+22	18	30	XX			2	3	L	NT	C													

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 H - Heavy Loose Riprap L - Light Loose Riprap SR - Shot Rock NT - Native (Bank Run) QS - Quarry Spalls

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MATERIALS LIST

LOCATION		CULVERT			DWNSPT		RIPRAP			FILL TYPE	TOLERANCE	REMARKS	
ROAD #	STATION	DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE				
MY-ML (cont'd)	59+36	18	30	XX			2	3	L	NT	C		
	59+97	18	30	XX			2	3	L	NT	C		
	60+67 to 60+97	-	-	-			-	-	-	-	-	Install 2 check dams, see clause 8-5 CHECK DAM.	
	61+85 to 62+35	50 FOOT SPAN, PRE-CONSTRUCTED, MODULAR TYPE, PAINTED STEEL BRIDGE AND PRE-CAST CONCRETE FOOTINGS						40	-	H/L	NT	A	See sections 11.1, 11.2, and DETAILS for BRIDGE SITE #2.
	64+70	18	44	XX			5	7	L	SR	C	Install rolling dip. See ROLLING DIP DETAIL.	
	68+33	18	44	XX			8	12	L	NT	C		
	72+11 to 72+71	60 FOOT SPAN, PRE-CONSTRUCTED, STEEL BRIDGE AND PRECAST CONCRETE FOOTING WITH STEEL TOWER ASSEMBLY						60	-	H/L	NT	A	See clauses 11.1, 11.2 and DETAILS BRIDGE SITE #3.
	73+80	18	34	XX			3	5	L	NT	C		
	77+20	24	40	GM			5	7	L/H	NT	C		
	78+89	24	36	GM			5	7	L/H	NT	C		
	79+48	18	34	XX			3	5	L	NT	C		
	81+64	18	42	XX			5	7	L	NT	C	Align to capture ditchwater from existing grade.	
	83+56	18	42	XX			5	7	L	NT	C		
	94+27	18	36	XX			5	7	L	NT	C		
	95+21	18	36	XX			3	5	L	NT	C		
	96+64	18	34	XX			3	5	L	NT	C		
	97+53 to 97+68	15' CONCRETE SLAB BRIDGE, PRECAST WALL ABUTMENT											See design details for BRIDGE SITE #4

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MATERIALS LIST

LOCATION		CULVERT			DWNSPT		RIPRAP			FILL TYPE	TOLERANCE	REMARKS
ROAD #	STATION	DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE			
MY-ML (cont'd)	98+28	18	34	XX			2	3	L	NT	C	
	99+45	24	34	GM			3	5	L/H	NT	C	
	102+00	18	36	XX			2	3	L	NT	C	
	107+46	-	-	-			-	-	-	-	-	
	111+68	18	36	XX			2	3	L	NT	C	
	115+72	24	34	GM			3	5	L/H	NT	C	
	116+13	-	-	-			-	-	-	-	-	
	117+02	30	36	GM			8	12	L/H	NT	C	Begin full bench construction. (See clause 4-12.)
	117+53	-	-	-			-	-	-	-	-	
	118+45	18	36	XX			3	5	L	NT	C	
	120+26	-	-	-			-	-	-	-	-	
	122+19	18	34	XX			2	3	L	NT	C	
	123+24	-	-	-			-	-	-	-	-	
	124+66	30	32	GM			8	10	L/H	NT	C	
	125+26	18	32	XX			2	3	L	NT	C	
	125+92	-	-	-			-	-	-	-	-	
	131+47	18	32	XX			2	3	L	NT	C	
	134+16	-	-	-			-	-	-	-	-	
	136+33	18	36	XX			2	3	L	NT	C	
	139+75	18	36	XX			2	3	L	NT	C	
	145+79	18	32	XX			2	3	L	NT	C	
	148+59	18	36	XX			3	5	L	NT	C	

Note: Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:

Diameter	Gage	Corrugation
18"	16	2 2/3" x 1/2"
24" - 48"	14	2 2/3" x 1/2"
54" - 96"	14	3" x 1"

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MATERIALS LIST

LOCATION		CULVERT			DWNSPT		RIPRAP			FILL TYPE	TOLERANCE	REMARKS
		DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE			
ROAD #	STATION											
MY-ML (cont'd)	150+56	-	-	-	-	-	-	-	-	-	Begin full bench construction. (See clause 4-12.)	
	151+40	18	32	XX			3	5	L	NT	C	
	153+63	18	32	XX			3	5	L	NT	C	
	155+18	-	-	-	-	-	-	-	-	-	End full bench construction.	
	156+11	18	36	XX			3	5	L	NT	C	
	157+75	24	36	GM			3	5	L/H	NT	C	
	159+81	-	-	-	-	-	-	-	-	-	Begin full bench construction. (See clause 4-12.)	
	160+21	18	32	XX			3	5	L	NT	C	
	160+53 to 162+02	-	-	-	-	-	40	350	L/H	-	See clause 8-10 STABILIZE SLOPES	
	162+28	-	-	-	-	-	-	-	-	-	Ditchout	
	164+41	18	36	XX			3	5	L	NT	C	
	165+90	24	36	GM			3	5	L/H	NT	C	
	168+10	18	36	GM			2	3	L	NT	C	
	169+16	-	-	-	-	-	-	-	-	-	Begin full bench construction. (See clause 4-12.)	
	171+15	18	32	GM			2	3	L	NT	C	
	174+32	18	36	GM			2	3	L	NT	C	
	174+68	-	-	-	-	-	-	-	-	-	Begin full bench construction. (See clause 4-12.)	
	176+79	18	32	GM			2	3	L	NT	C	
	179+00	-	-	-	-	-	-	-	-	-	End full bench construction.	

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MATERIALS LIST

LOCATION		CULVERT			DWNSPT		RIPRAP			FILL TYPE		TOLERANCE		REMARKS		
ROAD #	STATION	DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE					Diameter	Gage	Corrugation
MY-ML (cont'd)	181+95	18	36	GM			3	5	L	NT	C			18"	16	2 2/3" x 1/2"
	183+23	-	-	-	-	-	-	-	-	-	-			24" - 48"	14	2 2/3" x 1/2"
	185+17	-	-	-	-	-	-	-	-	-	-			54" - 96"	14	3" x 1"
	185+80	18	36	GM	20	GM	3	7	L	NT	C					
	188+61	18	40	GM			3	5	L	NT	C					
	193+02	-	-	-	-	-	-	-	-	-	-					
	196+53	18	36	GM			3	5	L	NT	C					
	197+16	-	-	-	-	-	-	-	-	-	-					
	198+34	18	32	XX			2	3	L	NT	C					
	199+43	18	36	GM			2	3	L	NT	C					
	200+99	-	-	-	-	-	-	-	-	-	-					
	203+65	-	-	-	-	-	-	-	-	-	-					
	204+95	18	32	XX			2	3	L	NT	C					
	206+94	24	32	GM			3	5	L	NT	C					
	210+55	24	36	GM			5	7	L	NT	C					
	214+65	18	36	GM			2	3	L	NT	C					
	217+50	18	36	GM			3	5	L	NT	C					
	221+65	18	32	GM			2	3	L	NT	C					
	226+02	-	-	-	-	-	-	-	-	-	-					
	227+85	18	32	XX			2	3	L	NT	C					
	231+40	-	-	-	-	-	-	-	-	-	-					

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MATERIALS LIST

LOCATION		CULVERT			DWNSPT		RIPRAP			FILL TYPE	TOLERANCE	REMARKS												
		DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE															
ROAD #	STATION																							
MY-12	1+11	18	32	XX			2	3	L	SR	C	<p>Note: Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:</p> <table border="1"> <thead> <tr> <th>Diameter</th> <th>Gage</th> <th>Corrugation</th> </tr> </thead> <tbody> <tr> <td>18"</td> <td>16</td> <td>2 2/3" x 1/2"</td> </tr> <tr> <td>24" - 48"</td> <td>14</td> <td>2 2/3" x 1/2"</td> </tr> <tr> <td>54" - 96"</td> <td>14</td> <td>3" x 1"</td> </tr> </tbody> </table>	Diameter	Gage	Corrugation	18"	16	2 2/3" x 1/2"	24" - 48"	14	2 2/3" x 1/2"	54" - 96"	14	3" x 1"
Diameter	Gage	Corrugation																						
18"	16	2 2/3" x 1/2"																						
24" - 48"	14	2 2/3" x 1/2"																						
54" - 96"	14	3" x 1"																						
	1+42	-	-	-	-	-	-	-	-	-	-													
	1+81	-	-	-	-	-	-	-	-	-	-													
	3+27	18	32	XX			2	3	L	SR	C													
	3+57	-	-	-	-	-	-	-	-	-	-													
	3+88	-	-	-	-	-	-	-	-	-	-													
	4+24	18	32	XX			2	3	L	SR	C													
	4+62	-	-	-	-	-	-	-	-	-	-													
	4+90	-	-	-	-	-	-	-	-	-	-													
	5+21	18	32	XX			2	3	L	SR	C													
	6+30	24	32	XX			3	5	L	SR	C													
	7+07	18	32	XX			2	3	L	SR	C													
	9+17	18	36	XX			2	3	L	SR	C													

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MATERIALS LIST

LOCATION	STATION	CULVERT			DWNSPT		RIPRAP			TOLERANCE	REMARKS
		DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE		
MY-21	5+34	18	36	XX			3	5	L	C	Note: Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter: Diameter 18" 24" - 48" 54" - 96" Gage 16 14 14 Corrugation 2 2/5" x 1/2" 2 2/5" x 1/2" 3" x 1"
	6+92 to 7+42	50 FOOT SPAN, WOOD DECK PRE-CONSTRUCTED, MODULAR TYPE, PAINTED STEEL BRIDGE AND PRE-CAST CONCRETE FOOTINGS				40	--	L/H	NT	A	
	10+45	18	34	XX			3	5	L	C	
	12+18	18	34	XX			3	5	L	C	
	14+74	18	36	XX			3	5	L	C	
	18+36	18	30	XX			2	5	L	C	
	19+56	18	34	GM	24	XX	3	5	L	C	
	21+00	18	36	XX			3	5	L	C	
	22+42	-	-	-	-	-	-	-	-	-	Start geotextile
	22+93	18	32	XX			3	5	L	C	End geotextile
	24+02	-	-	-	-	-	-	-	-	-	Start geotextile
	25+39	-	-	-	-	-	-	-	-	-	End geotextile
	25+96	18	32	XX			2	3	L	C	
	27+84	36	36	XX			8	12	L/H	C	Stream
	28+49	18	34	XX			3	5	L	C	End geotextile
	29+17	-	-	-	-	-	-	-	-	-	Ditchout
	32+80	18	34	XX			2	5	L	C	
	35+64	18	34	XX			3	5	L	C	

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MATERIALS LIST

LOCATION		CULVERT			DWNSPT		RIPRAP			FILL TYPE	TOLERANCE	REMARKS
ROAD #	STATION	DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE			
MY-2104	3+73	18	34	XX			3	5	L	NT	C	
	5+66	-	-	-	-	-	-	-	-	-	-	Start geotextile
	5+88	24	34	XX			5	7	L/H	NT	C	
	7+83	18	34	XX			3	5	L	NT	C	End geotextile
	9+45	18	34	XX			3	5	L	NT	C	
	11+76	-	-	-	-	-	-	-	-	-	-	-
MY-2104-01	0+60	18	36	XX			3	5	L	NT	C	
	1+14	24	40	XX			5	12	L/H	NT	C	Stream
	3+98	18	32	XX			3	5	L	NT	C	
	4+68	18	36	XX			3	5	L	NT	C	
	5+19	30	36	XX			8	12	L/H	NT	C	Stream
	6+57	18	32	XX			3	5	L	NT	C	
MY-2106	3+10	18	34	XX			2	5	L	NT	C	
	6+18	18	34	XX			3	5	L	NT	C	
	8+15	18	36	XX			3	5	L	NT	C	
	12+22	18	36	XX			3	5	L	NT	C	
	15+42	18	34	XX			3	5	L	NT	C	
	9+40	-	-	-	-	-	-	-	-	-	-	-

Note: Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:
 Diameter 18" Gage 16 Corrugation 2 2/3" x 1/2"
 24" - 48" 14 2 2/3" x 1/2"
 54" - 96" 14 3" x 1"

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FOREST ACCESS ROAD MAINTENANCE SPECIFICATIONS

Cuts and Fills

- Maintain slope lines to a stable gradient compatible with the construction materials. Remove slides from ditches and the roadway. Repair fill-failures, in accordance with Clause 4-6 EMBANKMENT SLOPE RATIO, with selected material or material approved by the Contract Administrator. Remove overhanging material from the top of cut slopes.
- Waste material from slides or other sources shall be placed and compacted in stable locations identified in the road plan or approved by the Contract Administrator, so that sediment will not deliver to any streams or wetlands.
- Slide material and debris shall not be mixed into the road surface materials, unless approved by the Contract Administrator.

Surface

- Grade and shape the road surface, turnouts, and shoulders to the original shape on the TYPICAL SECTION SHEET. Inslope or outslope as directed to provide a smooth, rut-free traveled surface and maintain surface water runoff in an even, unconcentrated manner.
- Blading shall not undercut the backslope or cut into geotextile fabric on the road.
- If required by the Contract Administrator, water shall be applied as necessary to control dust and retain fine surface rock.
- Surface material shall not be bladed off the roadway. Replace surface material when lost or worn away, or as directed by the Contract Administrator.
- Remove shoulder berms, created by grading, to facilitate drainage, except as marked or directed by the Contract Administrator.
- For roads with geotextile fabric: spread surface aggregate to fill in soft spots and wheel ruts (barrel spread) to prevent damage to the geotextile fabric.

Drainage

- Prevent silt bearing road surface and ditch runoff from delivering sediment to any streams or wetlands.
- Maintain rolling dips and drivable waterbars as needed to keep them functioning as intended.
- Maintain headwalls to the road shoulder level with material that will resist erosion.
- Maintain energy dissipaters at culvert outlets with non-erodible material or rock.
- Keep ditches, culverts, and other drainage structures clear of obstructions and functioning as intended.
- Inspect and clean culverts at least monthly, with additional inspections during storms and periods of high runoff. This shall be done even during periods of inactivity.

Preventative Maintenance

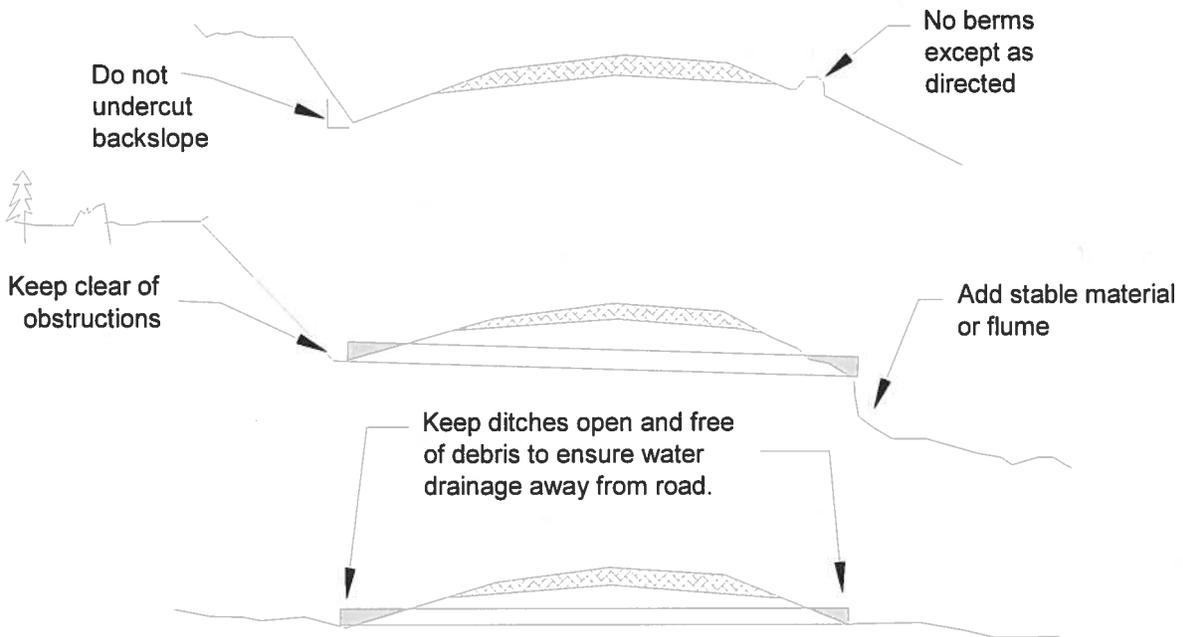
- Perform preventative maintenance work to safeguard against storm damage, such as blading to ensure correct runoff, ditch and culvert cleaning, and waterbar maintenance.

Termination of Use or End of Season

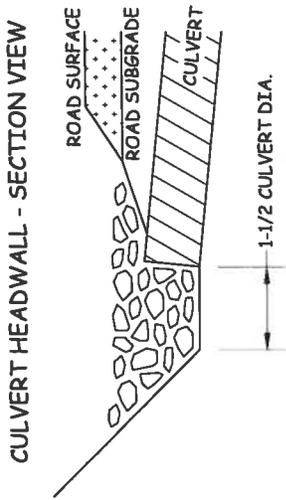
- At the conclusion of logging operations, ensure all conditions of these specifications have been met.

Debris

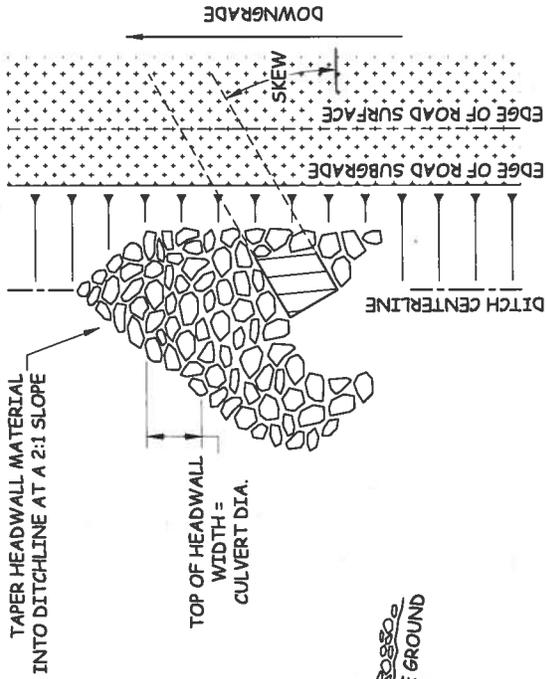
- Remove fallen timber, limbs, and stumps from the slopes, roadway, ditchlines, and culvert inlets.



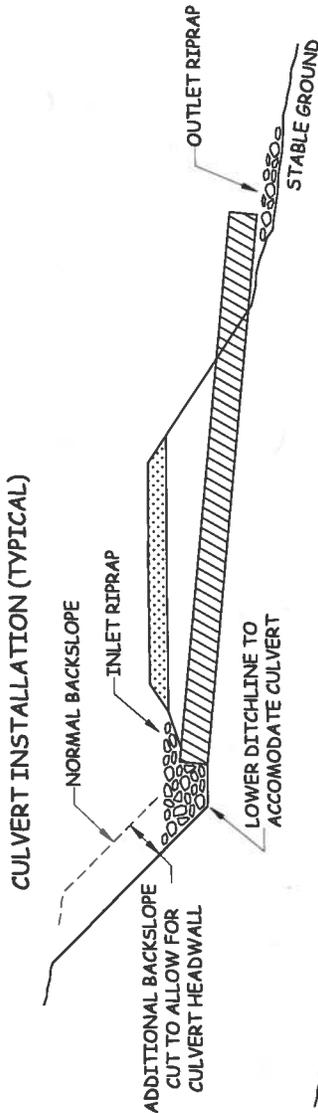
CULVERT AND DRAINAGE SPECIFICATIONS



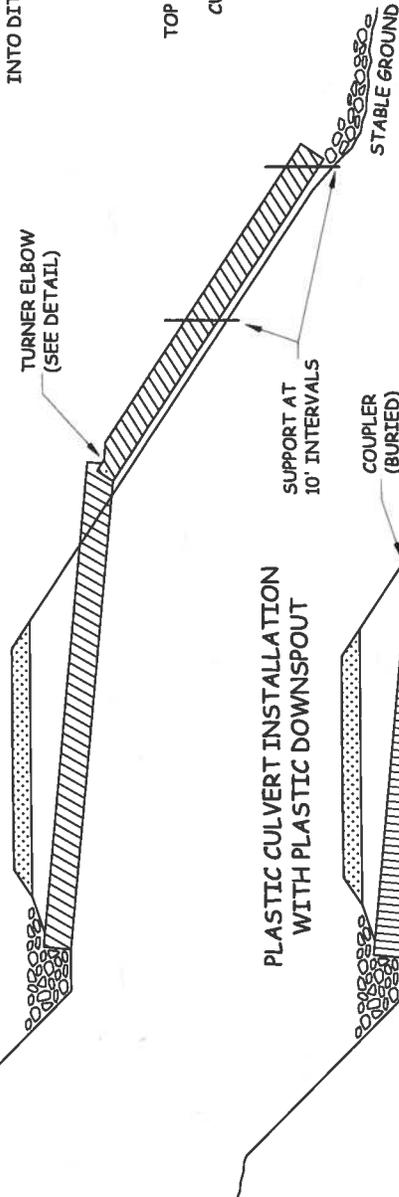
CULVERT HEADWALL - PLAN VIEW



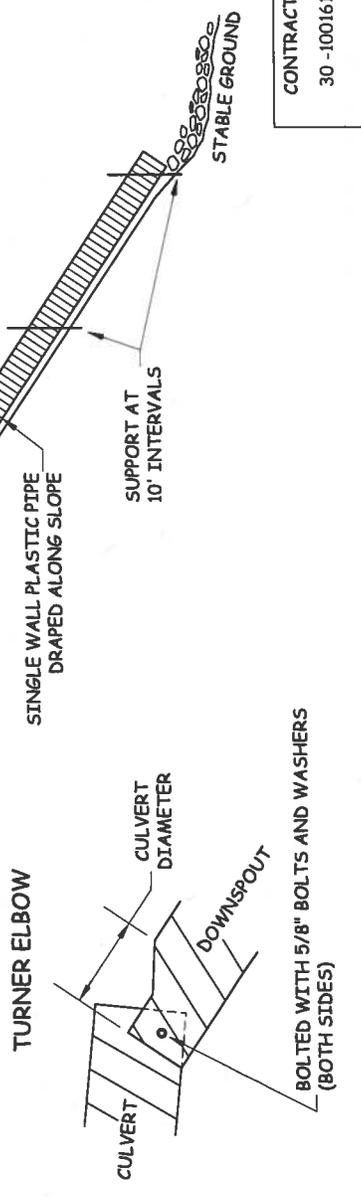
HEADWALL NOTE:
 HEADWALL TO BE CONSTRUCTED OF IMPERVIOUS MATERIAL THAT WILL RESIST EROSION AND ARMORED WITH RIPRAP QUANTITY SPECIFIED IN ROAD PLAN.



CULVERT INSTALLATION WITH DOWNSPOUT



PLASTIC CULVERT INSTALLATION WITH PLASTIC DOWNSPOUT



BOLTED WITH 5/8" BOLTS AND WASHERS (BOTH SIDES)

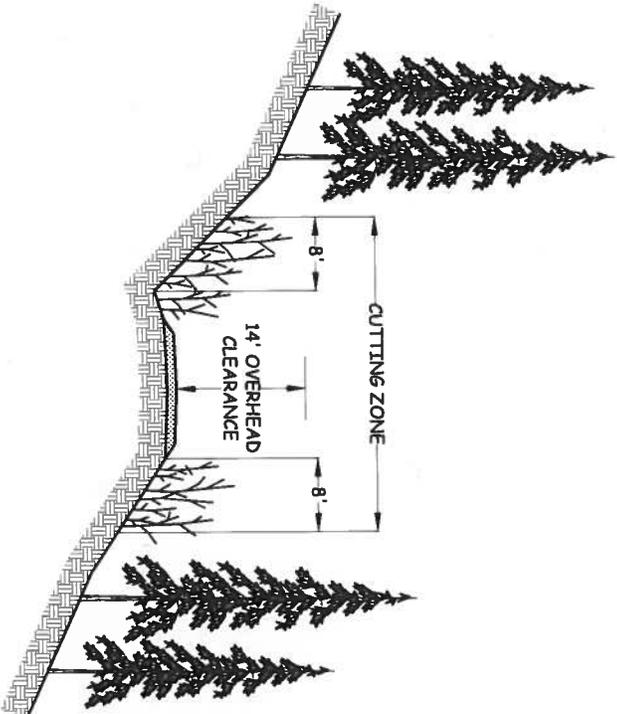
CONTRACT #
30 -100161

PROJECT
MIDDLE MAY

SHEET
55 OF 84

2817340

ROAD BRUSHING DETAILS



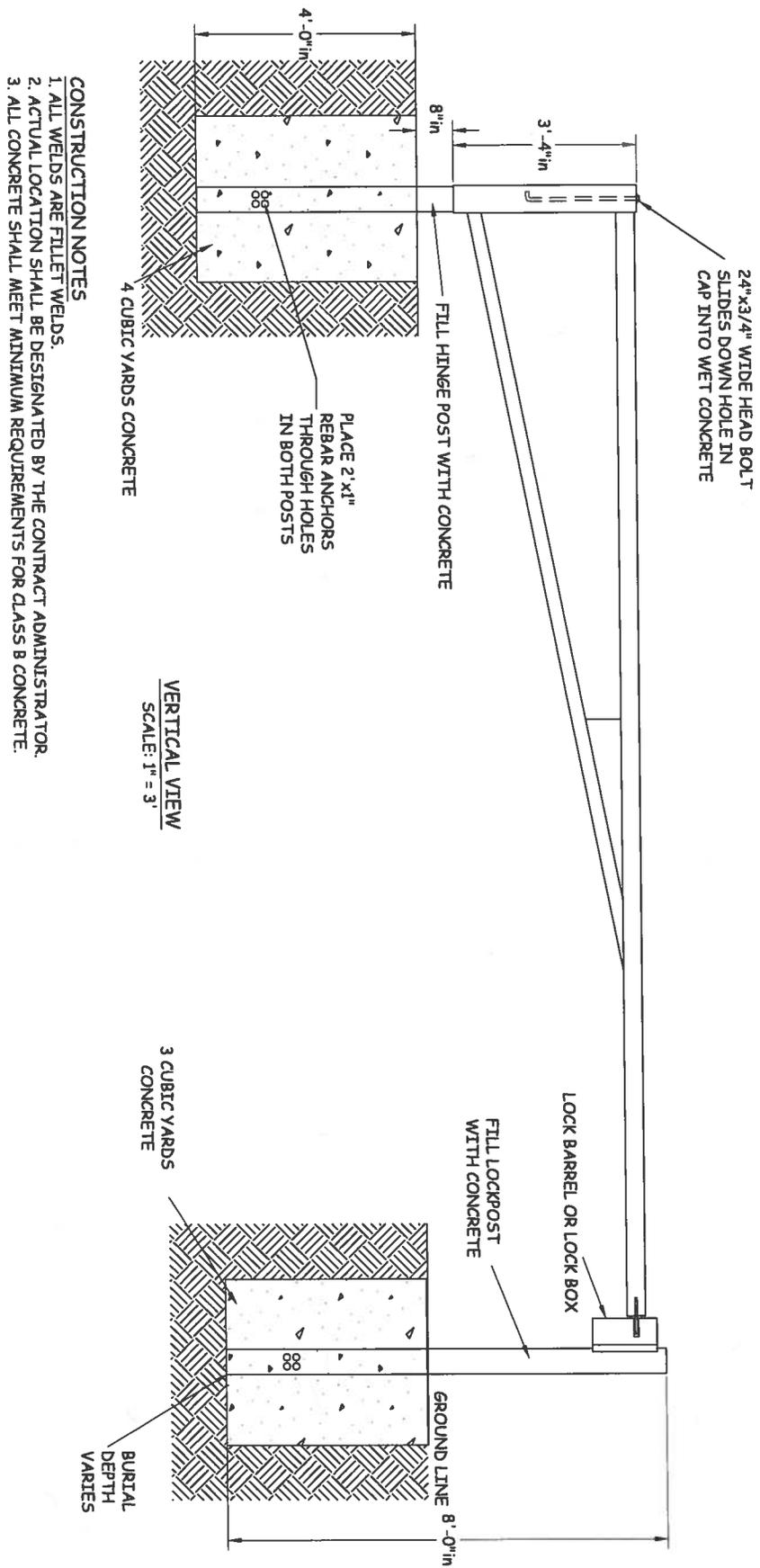
SPECIFICATIONS

- BRUSH SHALL BE CUT ON THE ROAD SURFACE AND 8 ft. BACK FROM ROAD DITCH AND OUTSIDE EDGE OF RUNNING SURFACE.
- ON THE INSIDE OF SWITCHBACKS AND TIGHT CURVES, BRUSH SHALL BE CUT BACK 16 ft. FOR VISIBILITY.
- ON TRUCK TURNOUTS, BRUSH SHALL BE CUT 8 ft. BACK FROM OUTSIDE EDGE.
- BRUSH SHALL BE CUT TO PROVIDE AN OVERHEAD CLEARANCE OF 14 ft. ABOVE THE ROAD RUNNING SURFACE.
- BRUSH SHALL BE CUT TO WITHIN 6 in. OF THE GROUND.
- SLASH SHALL BE REMOVED FROM CUT SLOPES ABOVE THE ROAD AND SCATTERED ON EMBANKMENT SLOPES.
- DITCHES SHALL BE CLEARED OF WOODY DEBRIS.
- CULVERT INLETS AND OUTLETS SHALL BE CLEANED A MINIMUM DISTANCE OF TWO PIPE DIAMETERS AWAY.

CONTRACT # 30 -100161	PROJECT MIDDLE WAY	SHEET 56 OF 84
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STEEL GATE INSTALLATION

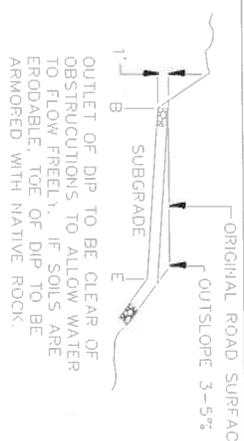
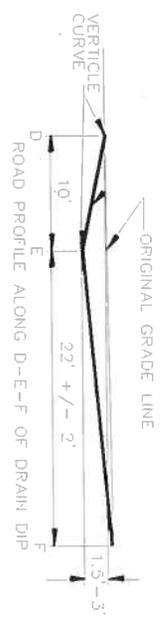
MY-ML 54+06



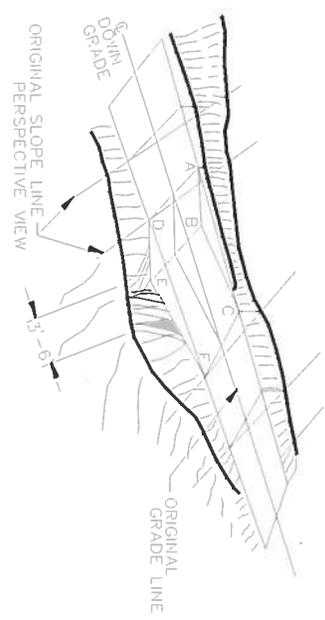
- CONSTRUCTION NOTES**
1. ALL WELDS ARE FILLET WELDS.
 2. ACTUAL LOCATION SHALL BE DESIGNATED BY THE CONTRACT ADMINISTRATOR.
 3. ALL CONCRETE SHALL MEET MINIMUM REQUIREMENTS FOR CLASS B CONCRETE.

CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 57 OF 84
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ROLLING DIP DETAIL



NOTE
 PLAN OF DIP SHOWN IS FOR OUTSLOPED ROLLING DIP. DIPS MAY BE EITHER INSLOPED OR OUTSLOPED. WHEN INSLOPED, DIPS SHALL DRAIN FREELY INTO DITCHES OR CULVERT INLETS. WHEN OUTSLOPED, THEY SHALL DRAIN FREELY ONTO NATURAL GROUND WHERE SOILS ARE ERODABLE. OUTLET SHALL BE ARMORED WITH NATIVE ROCK. THE MINIMUM CROSS GRADE FROM POINT B TO E IS 4% GREATER THAN THE ROAD SURFACE SLOPE. SKEW LINE B-E TO FIT LOW POINT IN DRAW, IF LOCATED IN NATURAL DRAIN

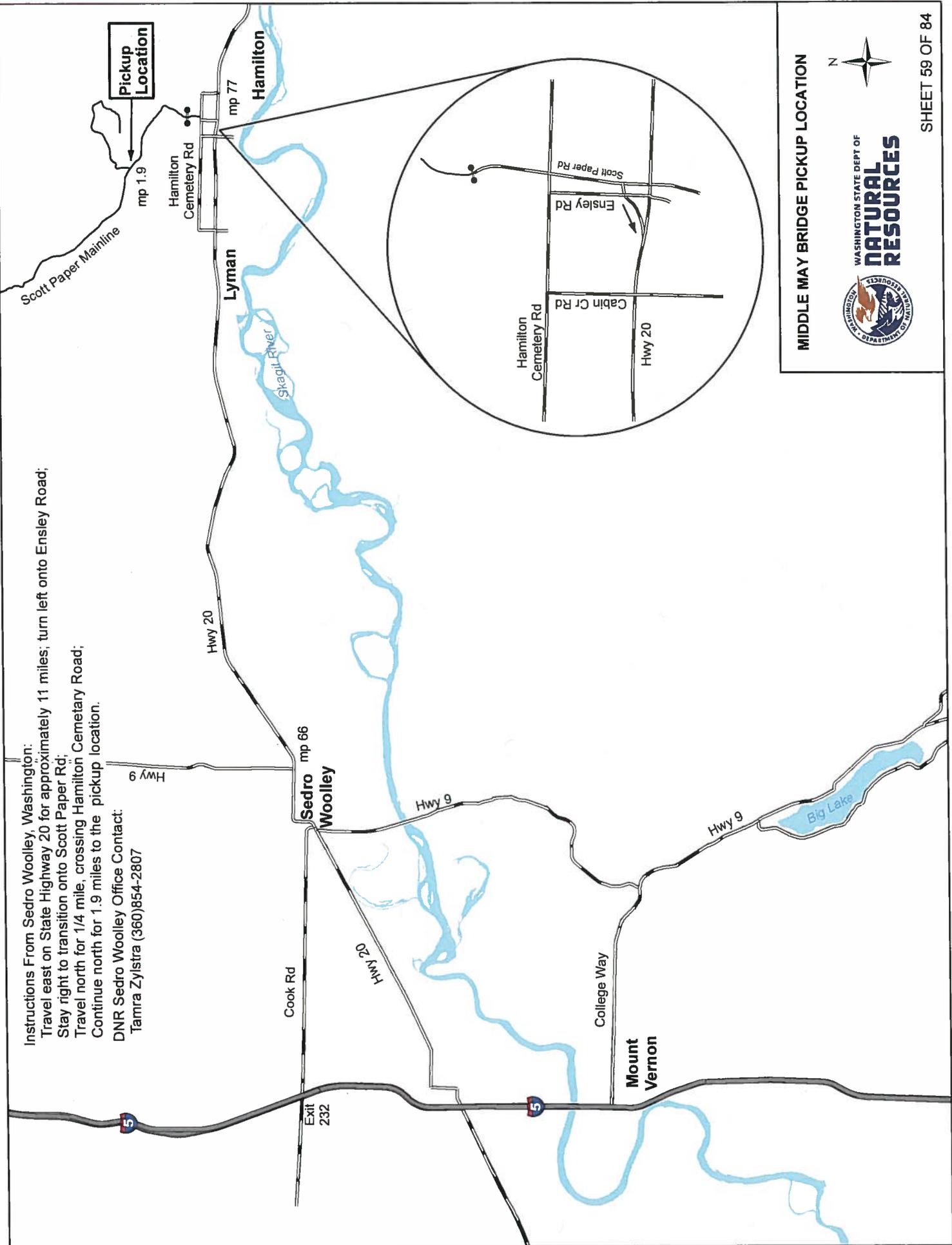


CONTRACT:
 30-100161

TIMBER SALE:
 MIDDLE MAY

Instructions From Sedro Woolley, Washington:
 Travel east on State Highway 20 for approximately 11 miles; turn left onto Ensley Road;
 Stay right to transition onto Scott Paper Rd;
 Travel north for 1/4 mile, crossing Hamilton Cemetary Road;
 Continue north for 1.9 miles to the pickup location.

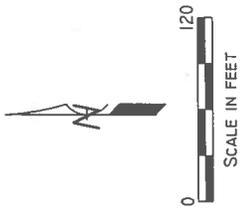
DNR Sedro Woolley Office Contact:
 Tamra Zylstra (360)854-2807



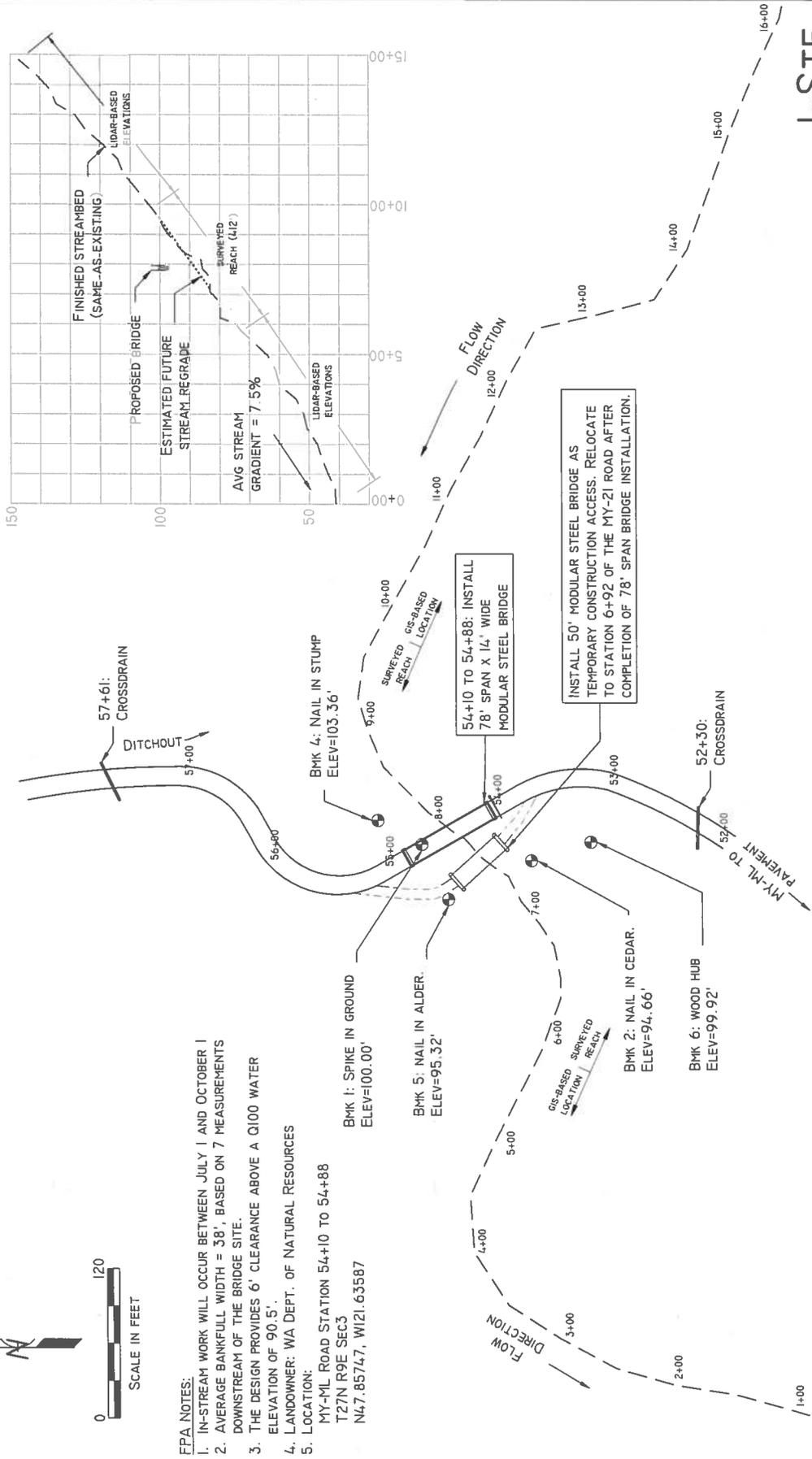
MIDDLE MAY BRIDGE PICKUP LOCATION



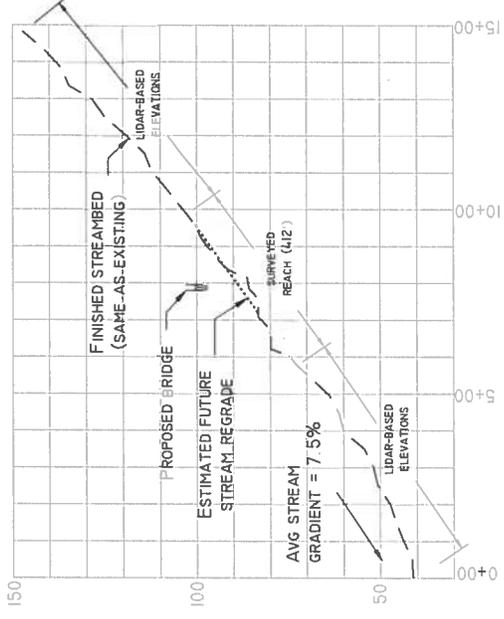
BRIDGE SITE #1
78'x14' MODULAR STEEL BRIDGE INSTALLATION
MY-ML ROAD STATION 54+10 TO 54+88
SITE OVERVIEW



- FPA NOTES:**
1. IN-STREAM WORK WILL OCCUR BETWEEN JULY 1 AND OCTOBER 1
 2. AVERAGE BANKFULL WIDTH = 38', BASED ON 7 MEASUREMENTS DOWNSTREAM OF THE BRIDGE SITE.
 3. THE DESIGN PROVIDES 6' CLEARANCE ABOVE A Q100 WATER ELEVATION OF 90.5'.
 4. LANDOWNER: WA DEPT. OF NATURAL RESOURCES
 5. LOCATION:
 MY-ML ROAD STATION 54+10 TO 54+88
 T27N R9E SEC3
 N47.85747, W121.63587



STREAM PROFILE
 (10X VERTICAL EXAGGERATION)



I-STE

DRAWING VERSION	CONTRACT #	PROJECT	SHEET
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BRIDGE SITE #1
78'x14' MODULAR STEEL BRIDGE INSTALLATION
MY-ML ROAD STATION 54+10 TO 54+88
PLAN VIEW

9+00

FLOW
DIRECTION

00+55

38' CBW

8+00

EXCAVATE REMNANT LOG CRIBBING
 AND ASSOCIATED FILL ON BOTH BANKS.
 TOE OF CONSTRUCTED RIPRAP
 ARMORED SLOPES SHALL MATCH THE
 NATURAL STREAM WIDTH.

INSTALL 78' SPAN X 14'
 WIDE MODULAR STEEL BRIDGE

54+07: INSTALL GATE

00+55

MY-ML
TO PAVEMENT

CONSTRUCTION
ACCESS TRAIL

OVERGROWN ORV TRAIL
TO BE USED FOR
CONSTRUCTION ACCESS.

CONSTRUCTION
ACCESS TRAIL

7+00

FLOW
DIRECTION



CONSTRUCTION NOTES
 CREATE TEMPORARY EQUIPMENT CROSSING BY
 PLACING LOGS PARALLEL TO STREAM FLOW SO
 THAT EQUIPMENT TRACKS REMAIN ABOVE
 WATER WHILE CROSSING

INSTALL 50' MODULAR STEEL BRIDGE AS TEMPORARY
 CONSTRUCTION ACCESS. RELOCATE TO STATION 6+92 OF
 THE MY-21 ROAD AFTER COMPLETION OF 78' SPAN BRIDGE
 INSTALLATION. SEE 50' TEMPORARY ACCESS BRIDGE
 INSTALLATION DRAWINGS FOR FURTHER INFORMATION.

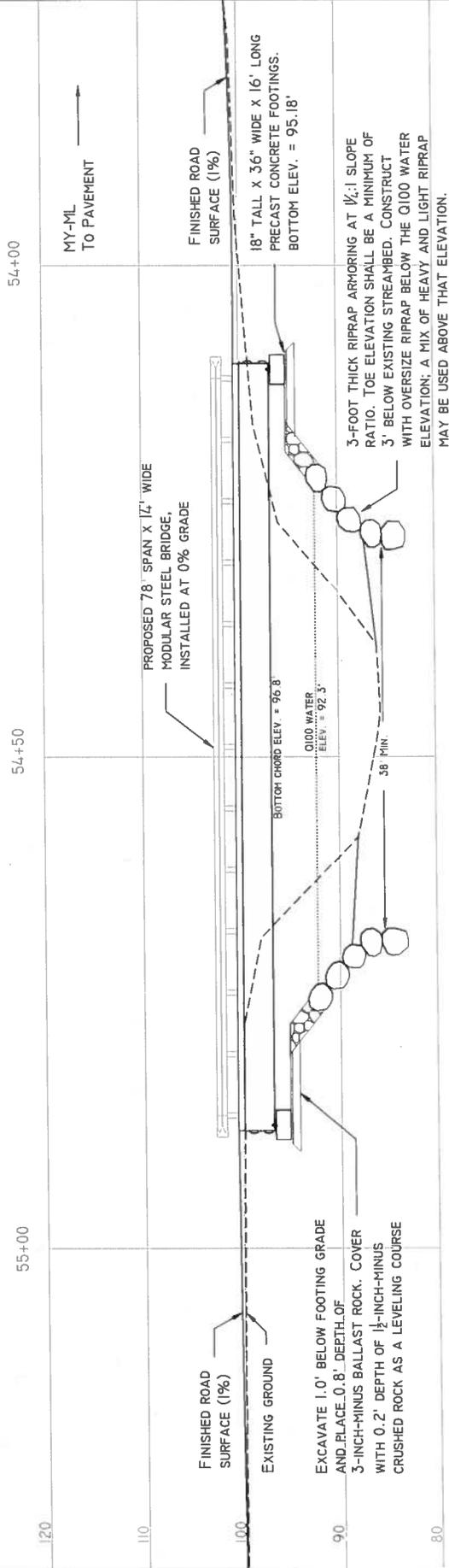
I-PLN

DRAWING VERSION 12/3/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 61 OF 84
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2817340

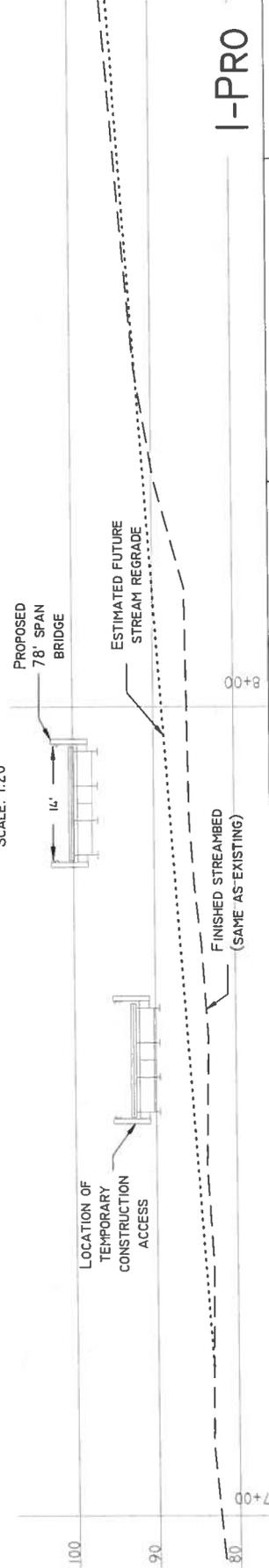
BRIDGE SITE #1
78'x14' MODULAR STEEL BRIDGE INSTALLATION
MY-ML ROAD STATION 54+10 TO 54+88

BRIDGE PROFILE - LOOKING UPSTREAM



BRIDGE SECTION

SCALE: 1:20



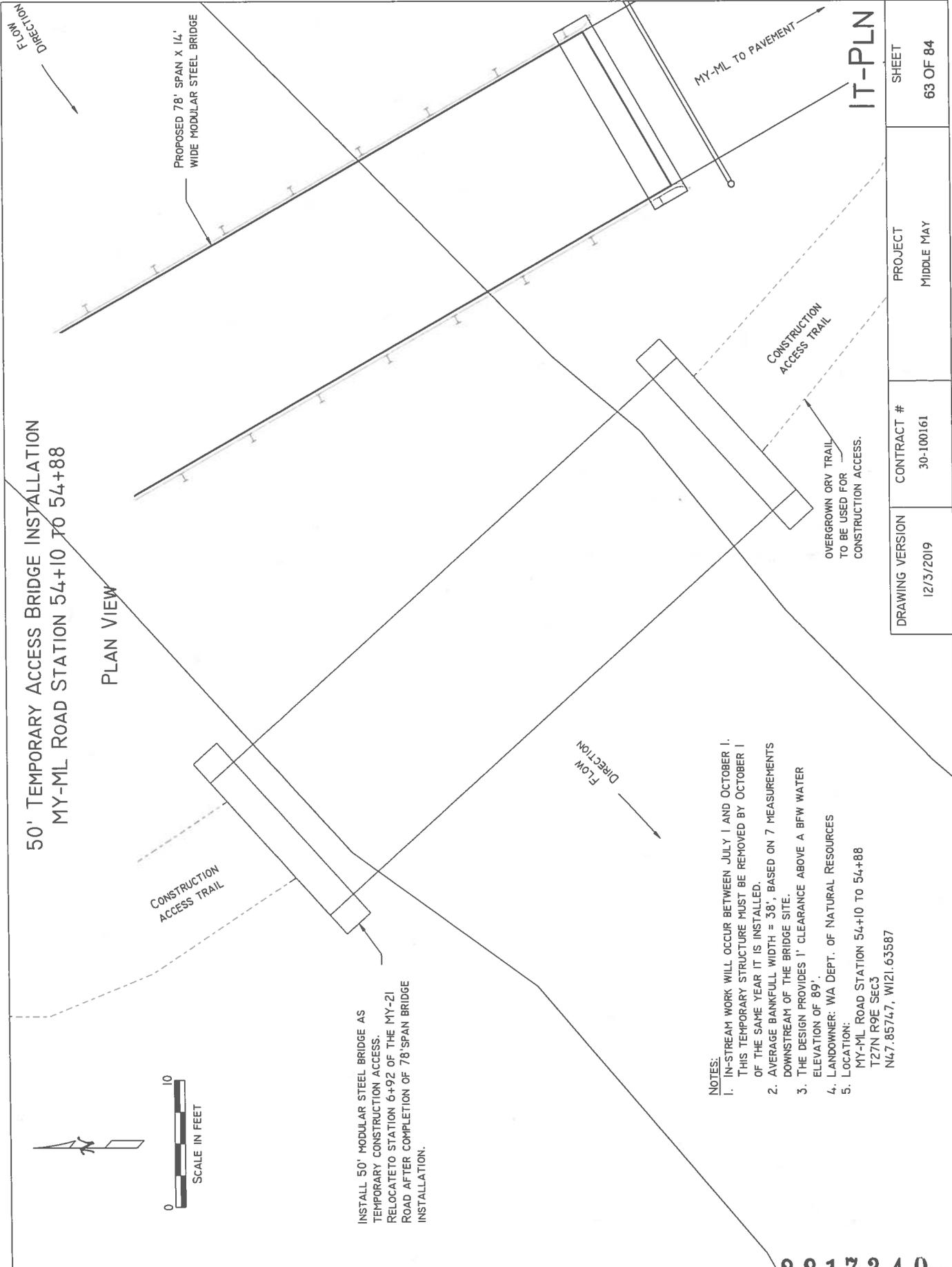
I-PRO

DRAWING VERSION 1/30/2020	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 62 OF 84
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281784U

50' TEMPORARY ACCESS BRIDGE INSTALLATION
MY-ML ROAD STATION 54+10 TO 54+88

PLAN VIEW



INSTALL 50' MODULAR STEEL BRIDGE AS
TEMPORARY CONSTRUCTION ACCESS.
RELOCATE TO STATION 6+92 OF THE MY-21
ROAD AFTER COMPLETION OF 78' SPAN BRIDGE
INSTALLATION.

- NOTES:
1. IN-STREAM WORK WILL OCCUR BETWEEN JULY 1 AND OCTOBER 1. THIS TEMPORARY STRUCTURE MUST BE REMOVED BY OCTOBER 1 OF THE SAME YEAR IT IS INSTALLED.
 2. AVERAGE BANKFULL WIDTH = 38', BASED ON 7 MEASUREMENTS DOWNSTREAM OF THE BRIDGE SITE.
 3. THE DESIGN PROVIDES 1' CLEARANCE ABOVE A BFW WATER ELEVATION OF 89'.
 4. LANDOWNER: WA DEPT. OF NATURAL RESOURCES
 5. LOCATION:
MY-ML ROAD STATION 54+10 TO 54+88
T27N R9E SEC3
N47.85747, W121.63587

IT-PLN

DRAWING VERSION	CONTRACT #	PROJECT	SHEET
12/3/2019	30-100161	MIDDLE MAY	63 OF 84

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BRIDGE SITE #1
 50' TEMPORARY ACCESS BRIDGE INSTALLATION
 MY-ML ROAD STATION 54+10 TO 54+88

BRIDGE PROFILE - LOOKING UPSTREAM



BACKFILL TO GRADE BEHIND BOTH
 ENDS OF BRIDGE WITH 3"-MINUS
 BALLAST ROCK. UPON FINAL
 REMOVAL OF TEMPORARY BRIDGE,
 ENHAUL ALL IMPORTED MATERIAL
 TO AN APPROVED WASTE AREA.

INSTALL 50' MODULAR STEEL BRIDGE AS
 TEMPORARY CONSTRUCTION ACCESS. WHEN
 REMOVED, STRUCTURE IS TO BE RELOCATED
 TO STATION 6+92 OF MY-21 ROAD.

EXISTING
 GROUND

45' BED WIDTH

ELEV = 87.8'

EXCAVATE A LEVEL SURFACE FOR
 TEMPORARY PLACEMENT OF PRECAST
 CONCRETE BLOCKS. ENHAUL EXCESS
 MATERIAL TO AN APPROVED WASTE AREA.

REPOSITION LARGE BOULDERS AS
 NECESSARY TO PROVIDE CLEARANCE
 FOR BRIDGE PLACEMENT.

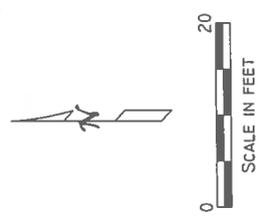
IT-PRO

DRAWING VERSION 12/3/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 64 OF 84
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2817340

BRIDGE SITE #1
 50' TEMPORARY ACCESS BRIDGE
 MY-ML ROAD STATION 54+10 TO 54+88

SITE RESTORATION PLAN



FLOW
 DIRECTION →

LOG-CRIBBING AND
 ASSOCIATED FILL
 REMOVED PRIOR TO 78'
 BRIDGE INSTALLATION.

RIPRAP ARMORING

MY-ML TO PAVEMENT

00+75

8+00

55+00

COVER CONSTRUCTION ACCESS ROAD
 WITH 6" LAYER OF TOPSOIL. TOPSOIL
 MAY BE OBTAINED FROM ROAD
 PIONEERING OPERATIONS. REVEGETATE
 WITH GRASS SEED AND COVER WITH
 EROSION CONTROL MATTING.

RESTORE NATURAL CONTOURS
 BY COMPACTING SHOT ROCK
 INTO AREAS LEVELLED FOR
 TEMPORARY BRIDGE.

PLACE LOGS USED FOR INITIAL
 EQUIPMENT CROSSING
 DOWNSTREAM OF THE PROJECT AS
 HABITAT ENHANCEMENT.

FLOW
 DIRECTION →

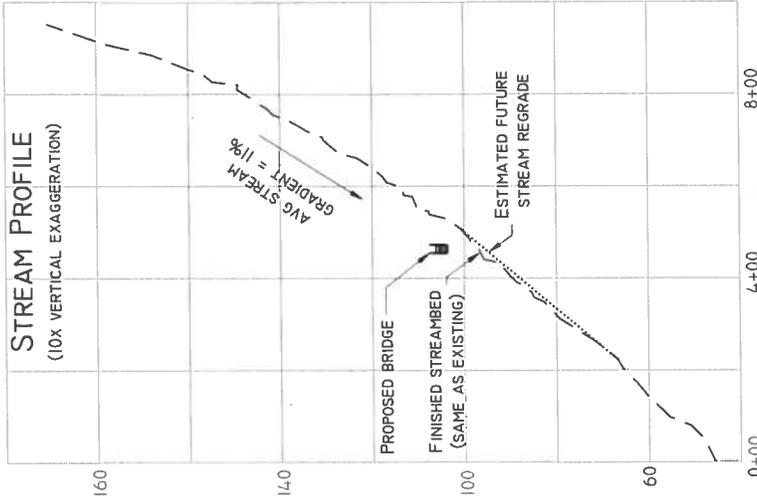
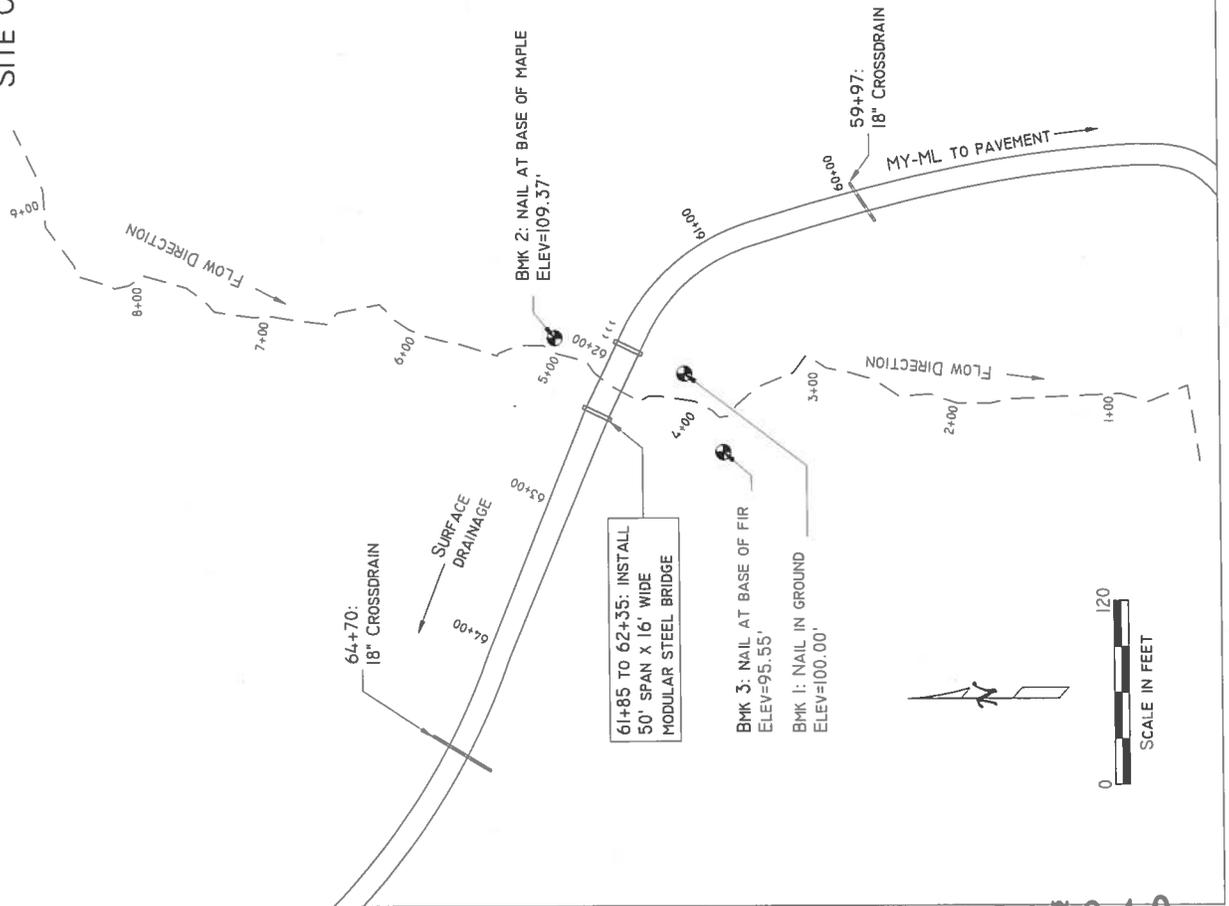
I-RST

DRAWING VERSION 12/3/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 65 OF 84
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2817340

BRIDGE SITE #2
50'x16' MODULAR STEEL BRIDGE INSTALLATION
MY-ML ROAD STATION 61+85 TO 62+35

SITE OVERVIEW



- FPA NOTES:**
1. IN-STREAM WORK WILL OCCUR BETWEEN JULY 1 AND OCTOBER 1
 2. AVERAGE BANKFULL WIDTH = 21', BASED ON 4 MEASUREMENTS NEAR THE STREAM CROSSING.
 3. THE DESIGN PROVIDES 5' CLEARANCE ABOVE A Q100 WATER ELEVATION OF 98.2'.
 4. LANDOWNER: WA DEPT. OF NATURAL RESOURCES
 5. LOCATION:
 MY-ML ROAD STATION 61+85 TO 62+35
 T27N R9E SEC3
 N47.85903, W121.63630

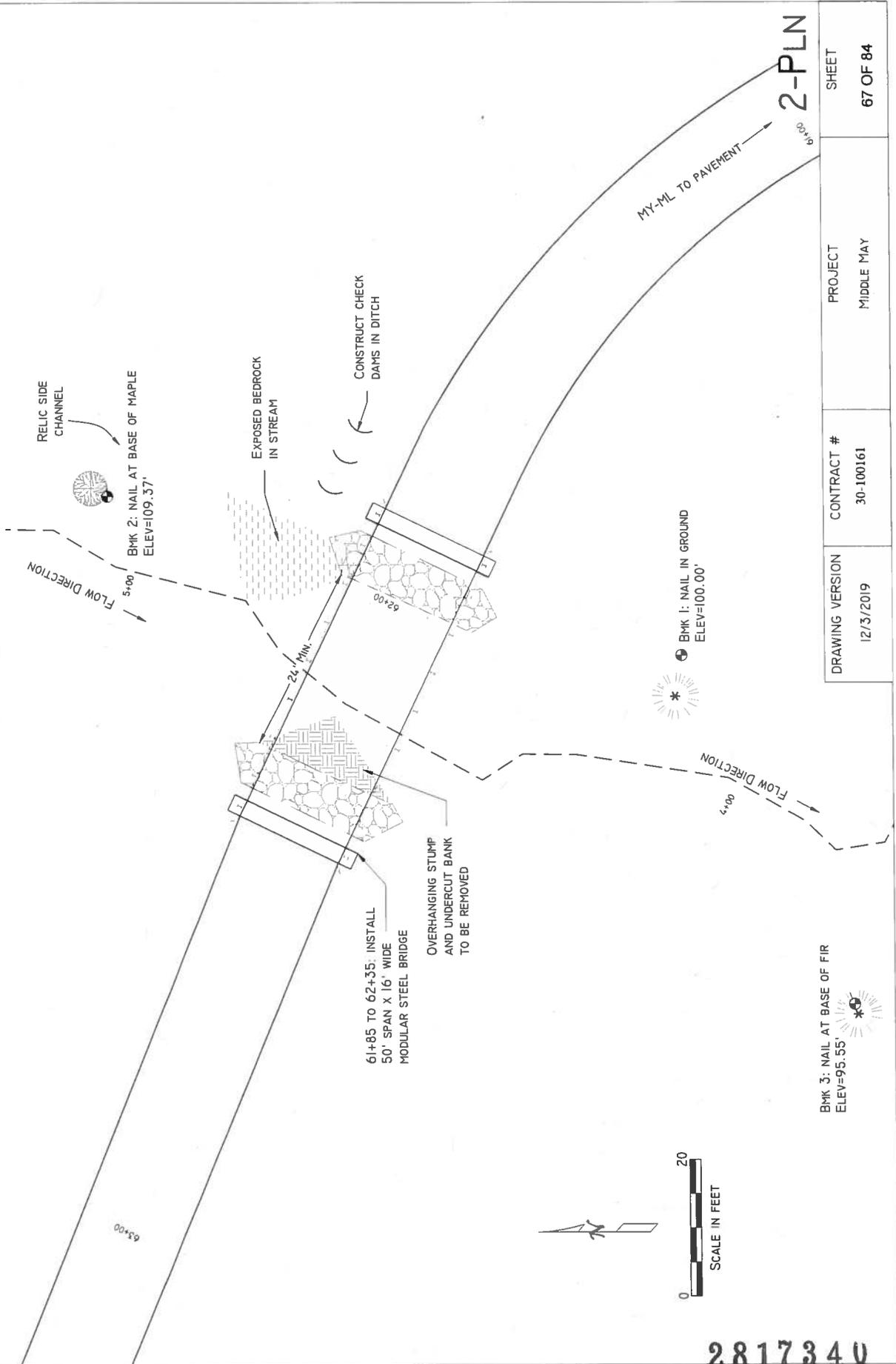
2-STE

DRAWING VERSION 12/3/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 66 OF 84
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2817340

BRIDGE SITE #2
 50' X 16' MODULAR STEEL BRIDGE INSTALLATION
 MY-ML ROAD STATION 61+85 TO 62+35

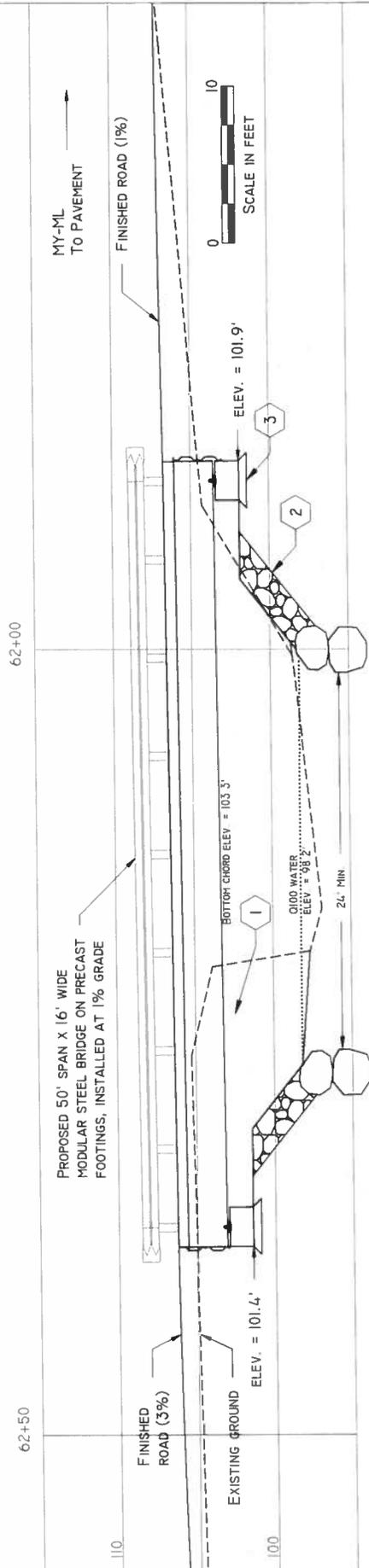
PLAN VIEW



DRAWING VERSION	CONTRACT #	PROJECT	SHEET
12/3/2019	30-100161	MIDDLE MAY	67 OF 84

2817340

BRIDGE SITE #2
50'X16' MODULAR STEEL BRIDGE INSTALLATION
MY-ML ROAD STATION 61+85 TO 62+35
BRIDGE PROFILE - LOOKING UPSTREAM

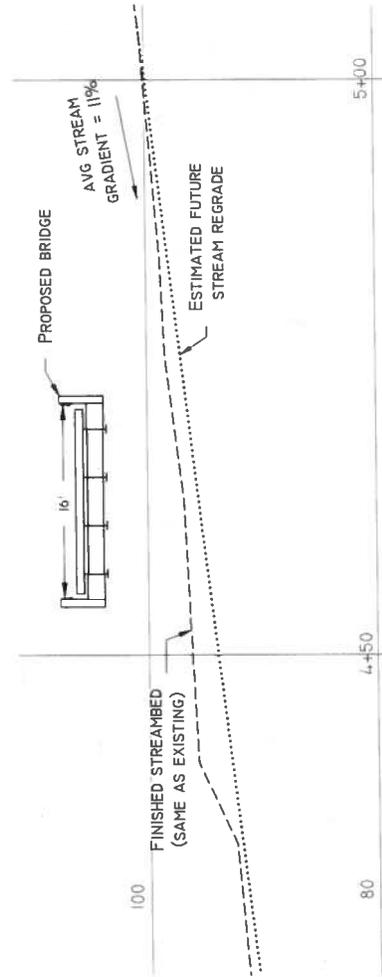


CONSTRUCTION NOTES:

- 1 OVERHANGING STUMP AND UNDERCUT BANK TO BE REMOVED
 - 2 3-FOOT THICK RIPRAP ARMORING AT 1:1 SLOPE RATIO. TOE ELEVATION SHALL BE A MINIMUM OF 3' BELOW EXISTING STREAMBED. CONSTRUCT WITH A MIX OF LIGHT AND HEAVY LOOSE RIPRAP
 - 3 OVEREXCAVATE 0.5' AND PLACE COMPACTED LAYER OF 1/2"-MINUS CRUSHED ROCK AS LEVELING COURSE
- CREATE TEMPORARY EQUIPMENT CROSSING BY PLACING LOGS PARALLEL TO STREAM FLOW SO THAT EQUIPMENT TRACKS REMAIN ABOVE WATER WHILE CROSSING

BRIDGE SECTION

SCALE: 1:16

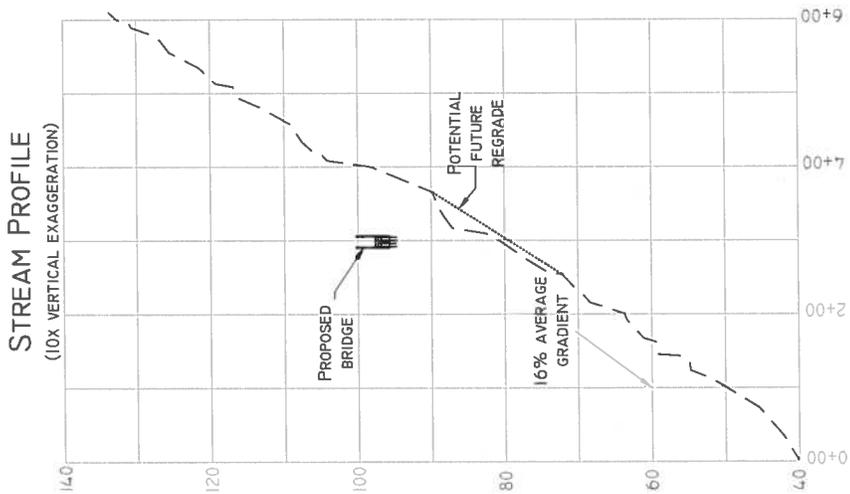
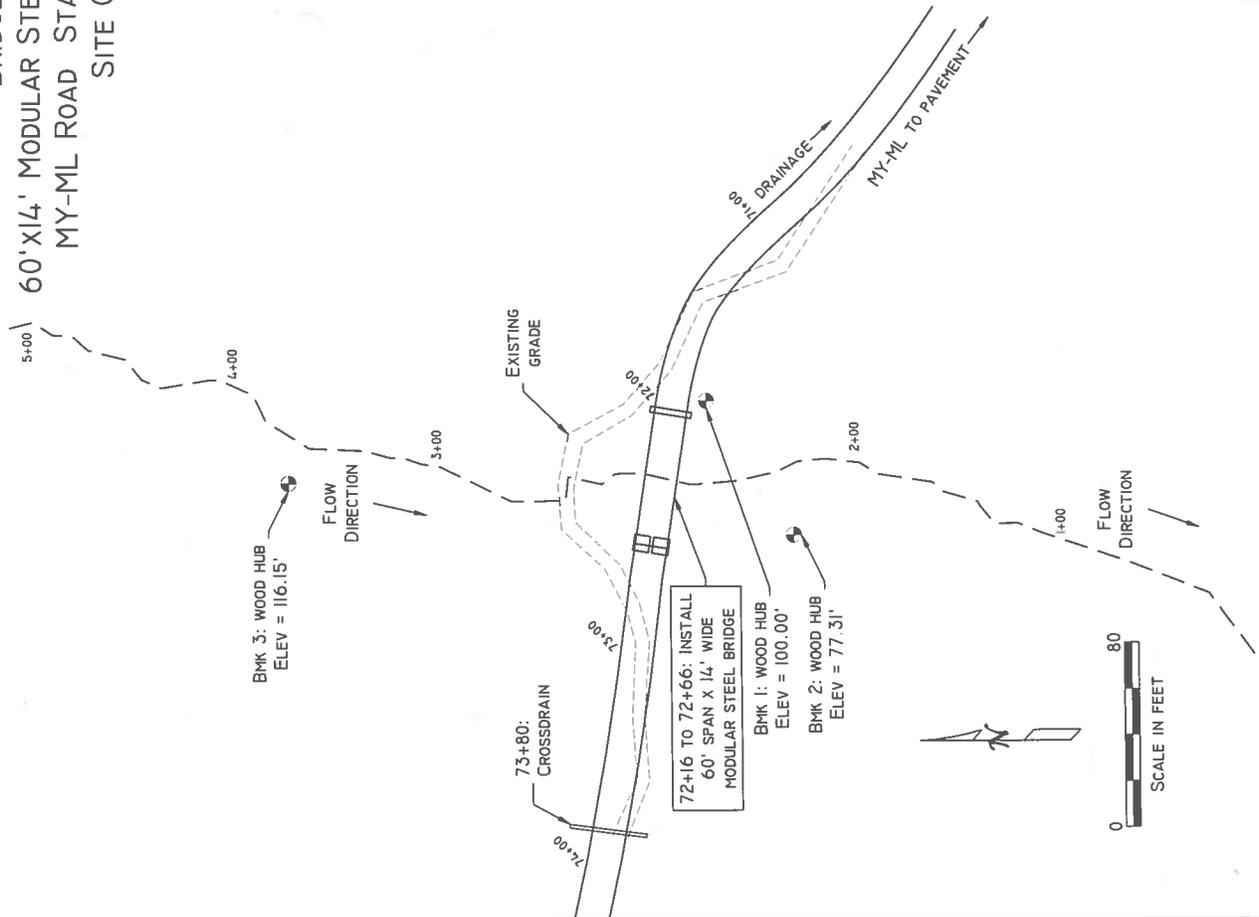


2-PRO

DRAWING VERSION	CONTRACT #	PROJECT	SHEET
12/3/2019	30-100161	MIDDLE MAY	68 OF 84

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BRIDGE SITE #3
60'x14' MODULAR STEEL BRIDGE INSTALLATION
MY-ML ROAD STATION 72+11 TO 72+71
SITE OVERVIEW



- FPA NOTES:**
1. IN-STREAM WORK WILL OCCUR BETWEEN JULY 1 AND OCTOBER 1
 2. AVERAGE BANKFULL WIDTH = 8.2', BASED ON 6 MEASUREMENTS UPSTREAM OF THE BRIDGE SITE.
 3. THE DESIGN PROVIDES 12' CLEARANCE ABOVE A Q100 WATER ELEVATION OF 81.9'.
 4. LANDOWNER: WA DEPT. OF NATURAL RESOURCES
 5. LOCATION:
 MY-ML ROAD STATION 72+11 TO 72+71
 T27N R9E SEC3
 N47.86070, W121.63955

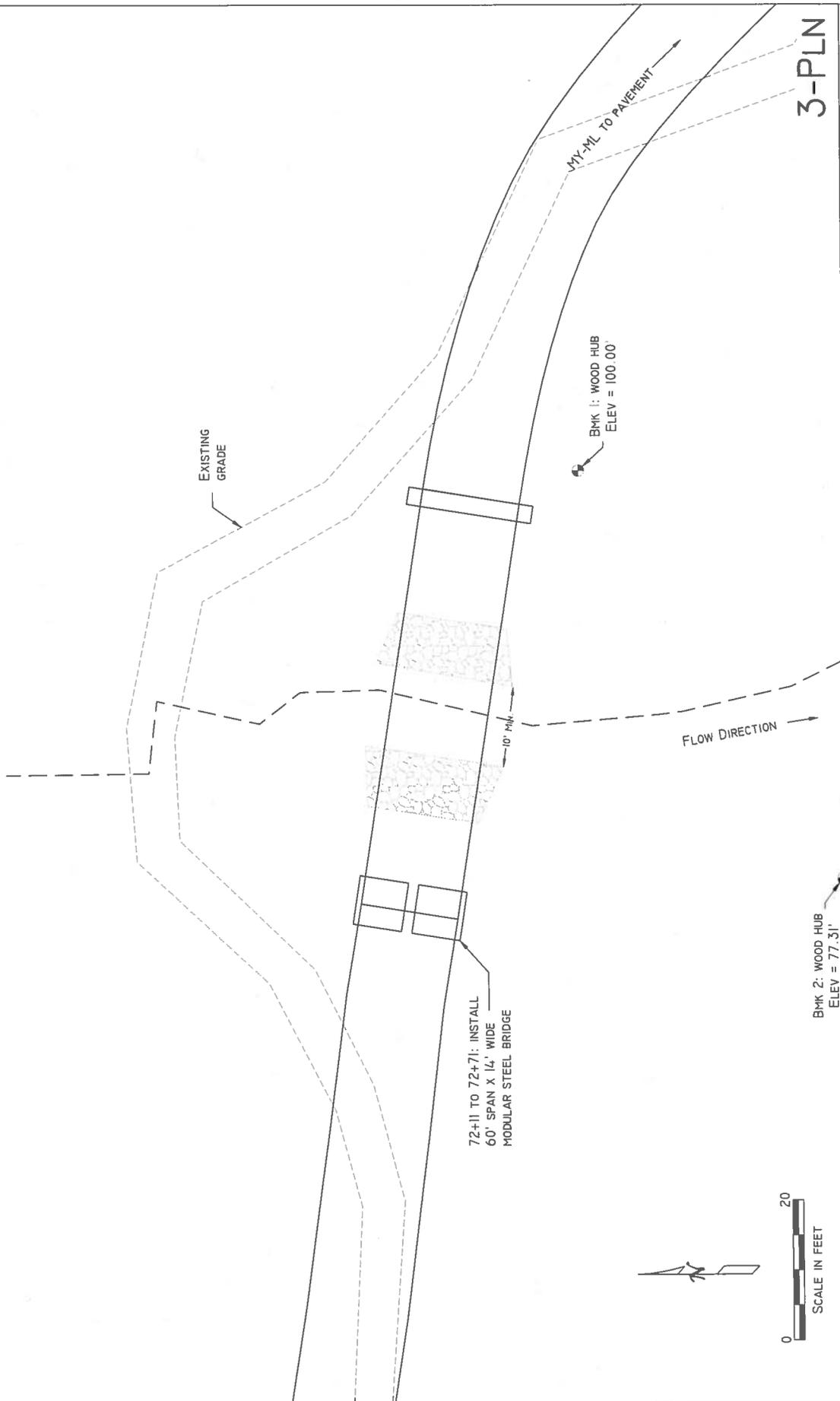
3-STE

DRAWING VERSION 12/3/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 69 OF 84
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2817340

BRIDGE SITE #3
 60'x14' MODULAR STEEL BRIDGE INSTALLATION
 MY-ML ROAD STATION 72+11 TO 72+71

PLAN VIEW



3-PLN

SHEET
70 OF 84

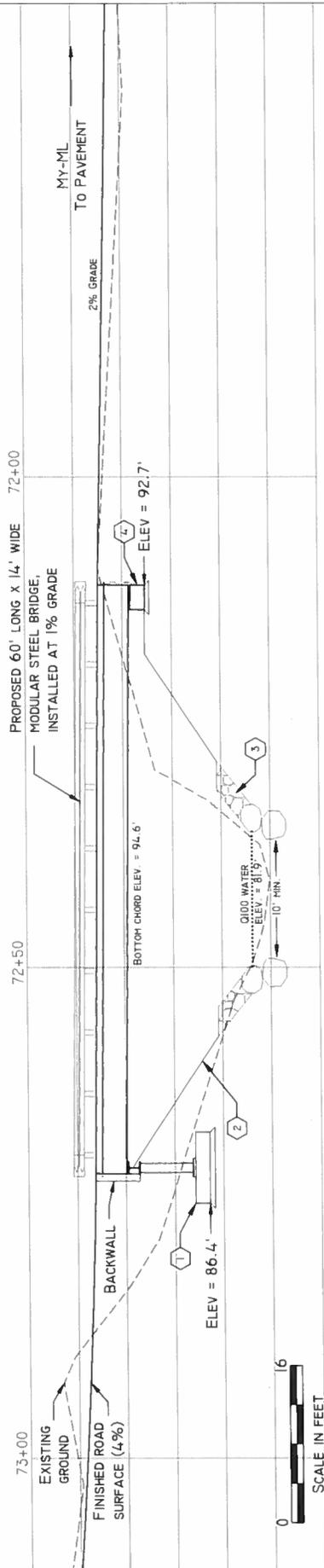
PROJECT
MIDDLE MAY

CONTRACT #
30-100161

DRAWING VERSION
12/3/2019

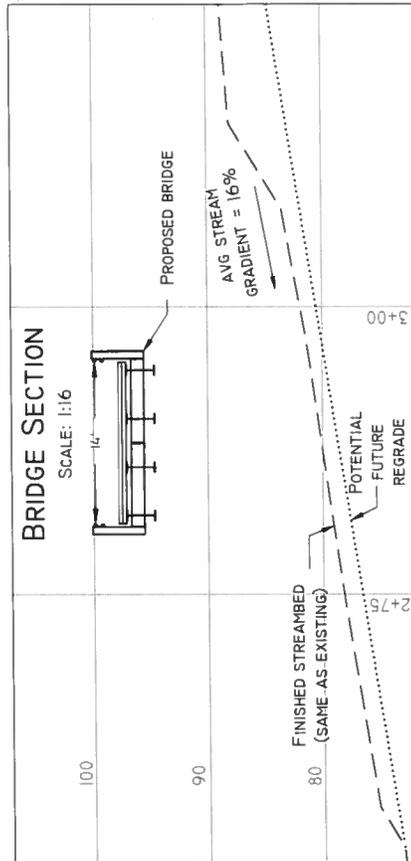
2817340

BRIDGE SITE #3
60'x14' MODULAR STEEL BRIDGE INSTALLATION
MY-ML ROAD STATION 72+11 TO 72+71
BRIDGE PROFILE - LOOKING DOWSTREAM



CONSTRUCTION NOTES:

- 1 PRECAST CONCRETE FOOTING WITH STEEL TOWER ASSEMBLY. OVEREXCAVATE 0.5' AND PLACE COMPACTED LAYER OF 1/2"-MINUS CRUSHED ROCK AS LEVELING COURSE
 - 2 COMPACTED NATIVE FILL AT FINISHED SLOPE OF 1/2:1
 - 3 3-FOOT THICK RIPRAP ARMORING AT 1/2:1 SLOPE RATIO. COUNTERSINK TOE 3FT BELOW STREAMBED. CONSTRUCT WITH A MIX OF LIGHT AND HEAVY LOOSE RIPRAP
 - 4 PRECAST CONCRETE FOOTING. OVEREXCAVATE 0.5' AND PLACE COMPACTED LAYER OF 1/2"-MINUS CRUSHED ROCK AS LEVELING COURSE
- CREATE TEMPORARY EQUIPMENT CROSSING BY PLACING LOGS PARALLEL TO STREAM FLOW SO THAT EQUIPMENT TRACKS REMAIN ABOVE WATER WHILE CROSSING

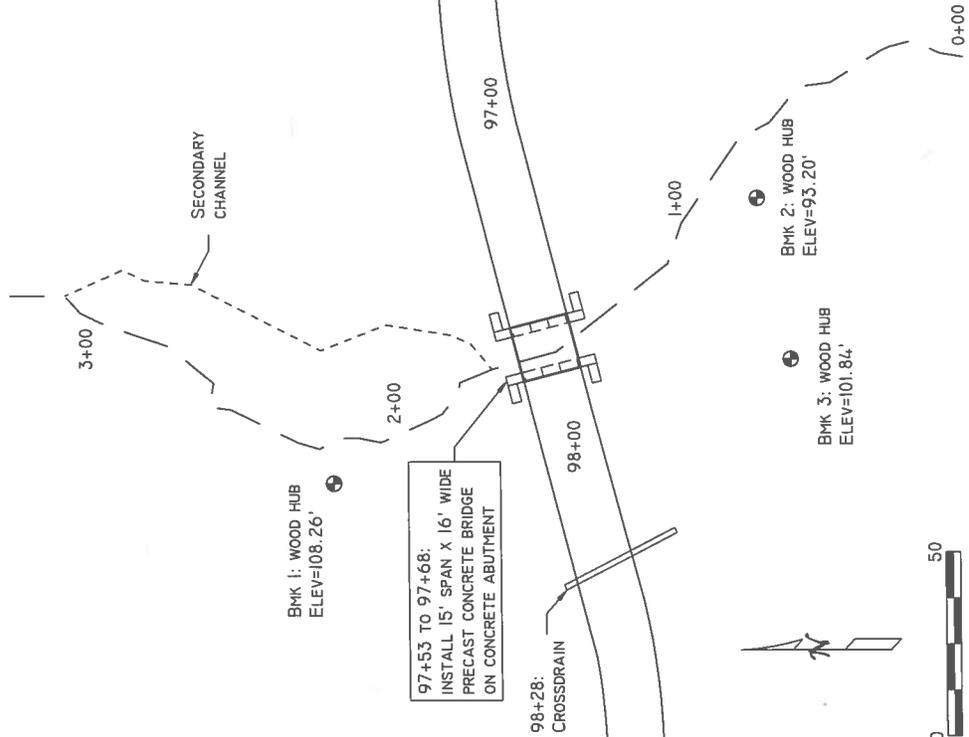
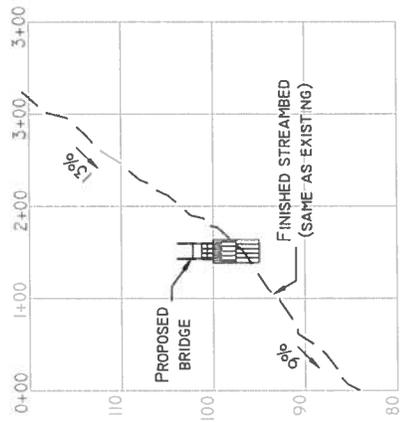


3-PRO

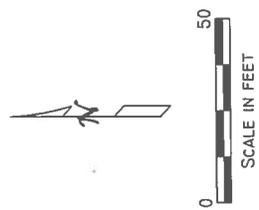
DRAWING VERSION 12/3/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 71 OF 84
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2817340

BRIDGE SITE #4
15'X16' PRECAST CONCRETE BRIDGE INSTALLATION
MY-ML ROAD STATION 97+53 TO 97+68
SITE OVERVIEW



- FPA NOTES:**
1. IN-STREAM WORK WILL OCCUR BETWEEN JULY 1 AND OCTOBER 1
 2. AVERAGE BANKFULL WIDTH = 6.1', BASED ON 9 STREAM MEASUREMENTS NEAR THE STREAM CROSSING
 3. LANDOWNER: WA DEPT. OF NATURAL RESOURCES
 4. LOCATION:
 MY-ML ROAD STATION 97+53 TO 97+68
 T27N R9E SEC4
 N47.86172, W121.64920



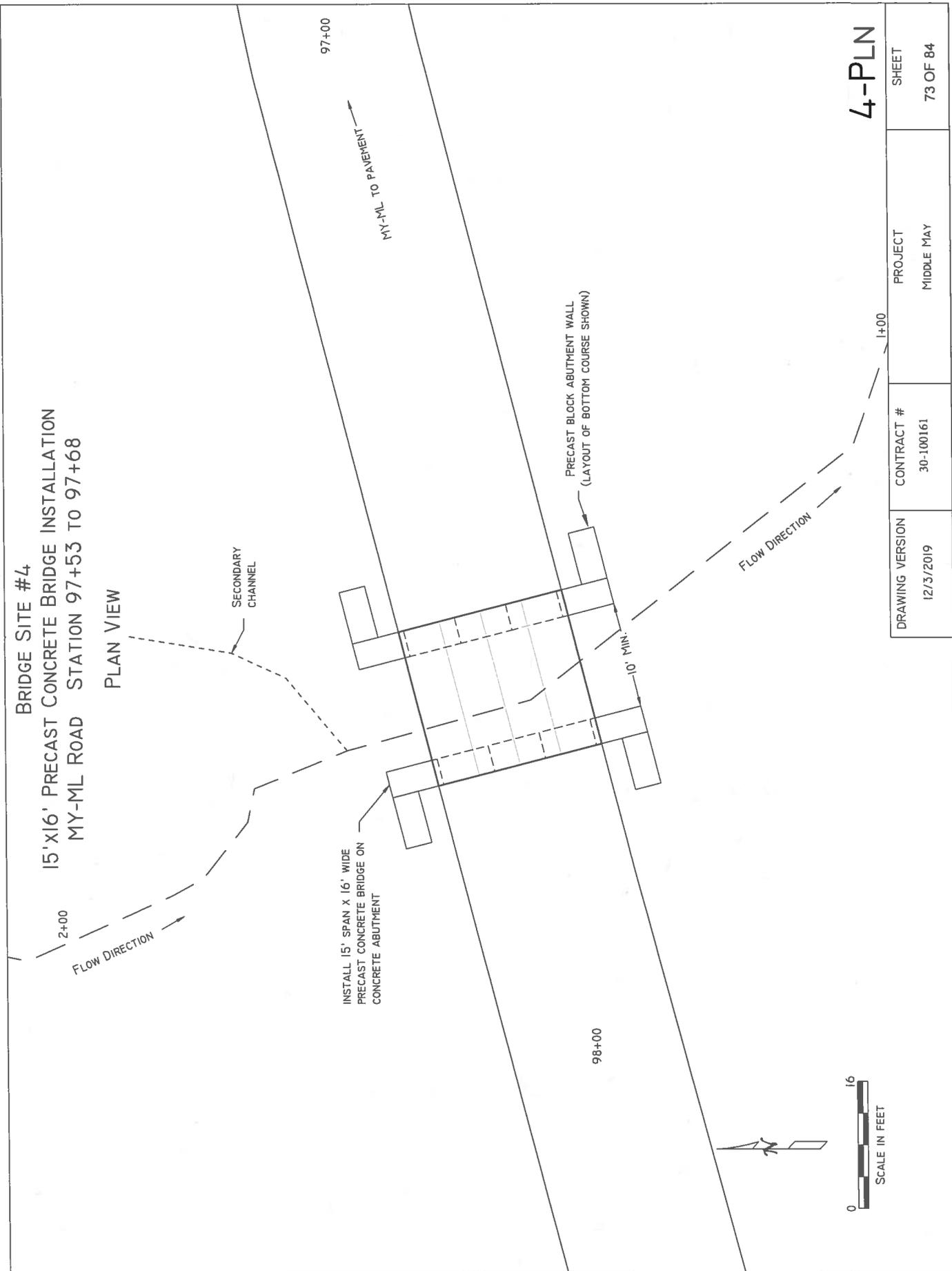
4-STE

DRAWING VERSION 12/3/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 72 OF 84
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2817340

BRIDGE SITE #4
 15'x16' PRECAST CONCRETE BRIDGE INSTALLATION
 MY-ML ROAD STATION 97+53 TO 97+68

PLAN VIEW



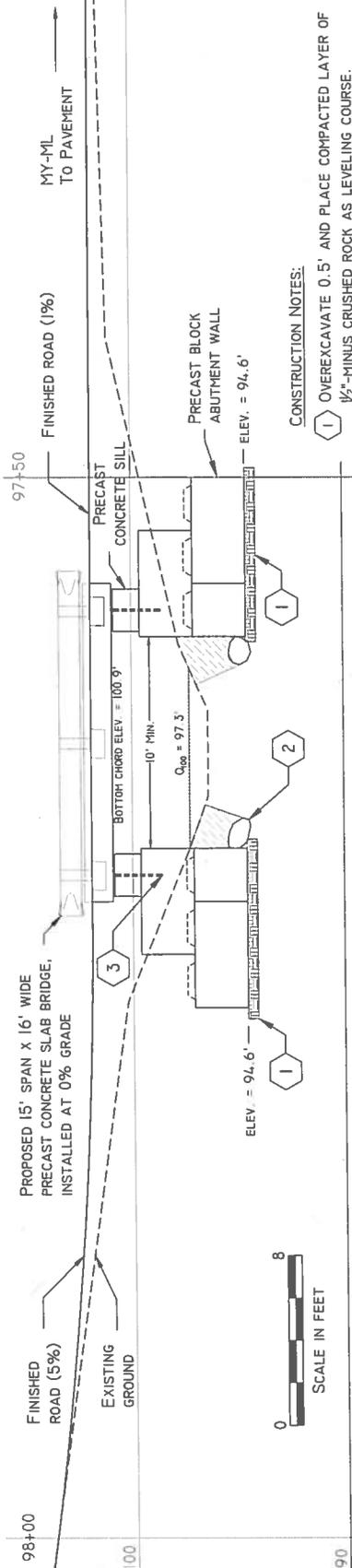
4-PLN

DRAWING VERSION 12/3/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 73 OF 84
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2817340

BRIDGE SITE #4
15'x16' PRECAST CONCRETE BRIDGE INSTALLATION
MY-ML ROAD STATION 97+53 TO 97+68

BRIDGE PROFILE - LOOKING UPSTREAM

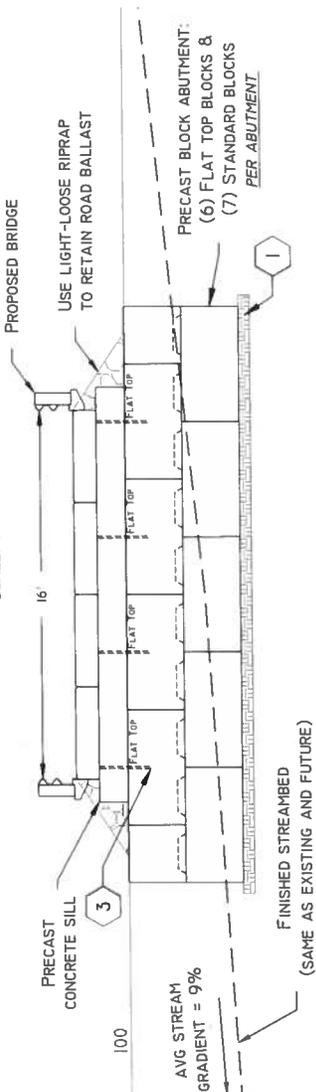


CONSTRUCTION NOTES:

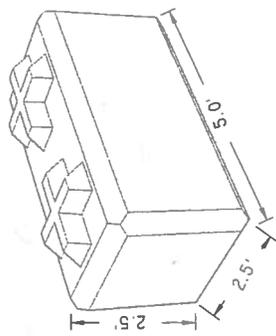
- 1 OVEREXCAVATE 0.5' AND PLACE COMPACTED LAYER OF 1/2" MINUS CRUSHED ROCK AS LEVELING COURSE.
 - 2 ARMOR WALL WITH LIGHT-LOOSE RIPRAP. BACKFILL TO STREAM ELEVATION WITH A MIXTURE OF 50% PITRUN GRAVEL AND 50% COBBLE.
 - 3 GROUT 1"x1/8" DRIFT PIN INTO 1/2" DIA HOLE, MIN. 1 PER BLOCK
- CREATE TEMPORARY EQUIPMENT CROSSING BY PLACING LOGS PARALLEL TO STREAM FLOW SO THAT EQUIPMENT TRACKS REMAIN ABOVE WATER WHILE CROSSING

BRIDGE SECTION

SCALE: 1:8



PRECAST BLOCK DETAIL
 (STANDARD BLOCK WITH SHEAR-KEY SHOWN)



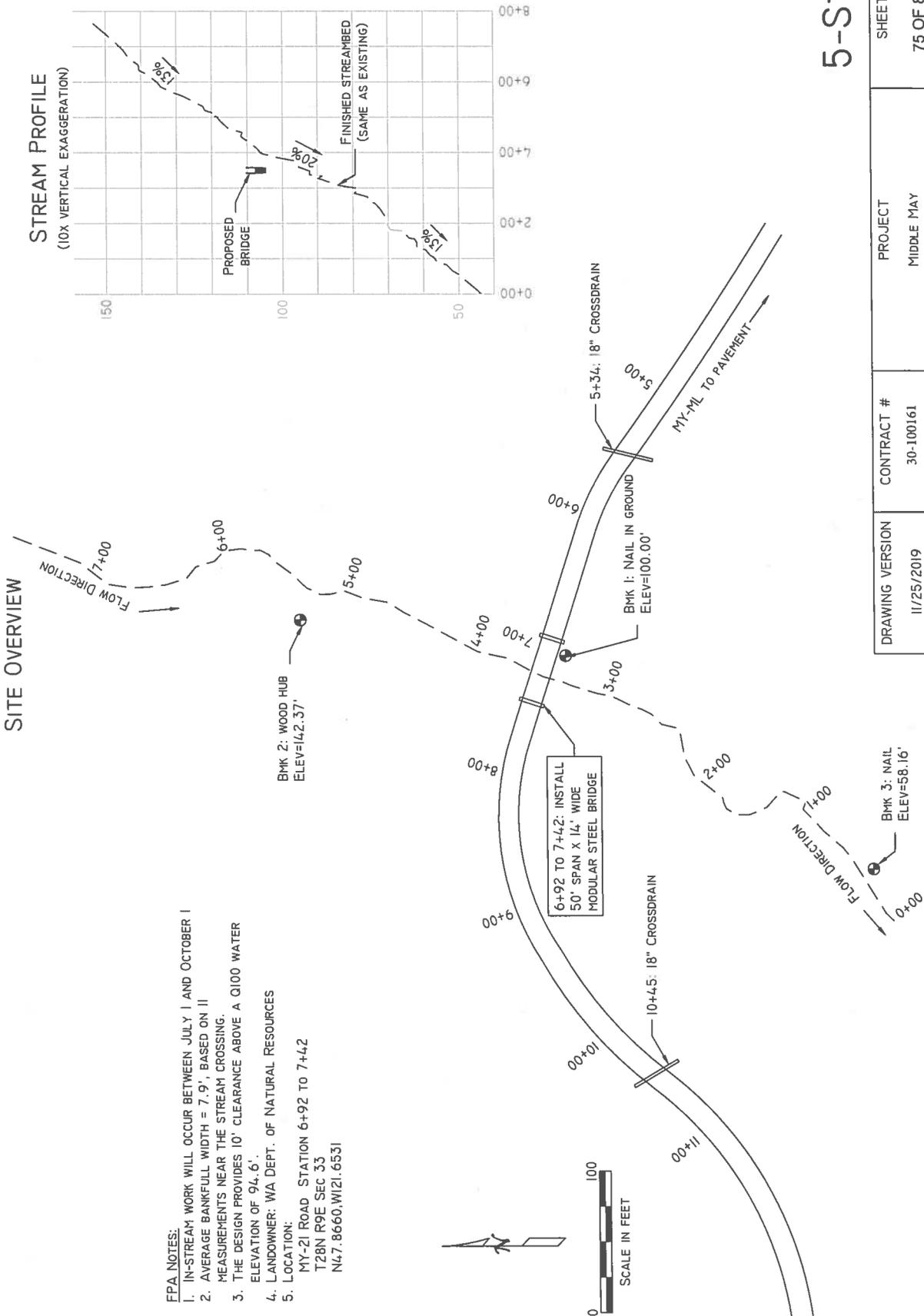
DRAWING VERSION	CONTRACT #	PROJECT	SHEET
12/3/2019	30-100161	MIDDLE MAY	74 OF 84

4-PRO

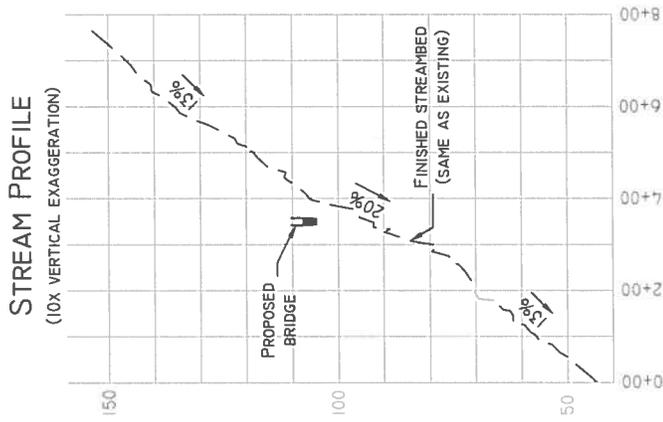
2817340

BRIDGE SITE #5
 50'x14' MODULAR STEEL BRIDGE INSTALLATION
 MY-21 ROAD STATION 6+92 TO 7+42

SITE OVERVIEW



- FPA NOTES:
1. IN-STREAM WORK WILL OCCUR BETWEEN JULY 1 AND OCTOBER 1
 2. AVERAGE BANKFULL WIDTH = 7.9', BASED ON 11 MEASUREMENTS NEAR THE STREAM CROSSING.
 3. THE DESIGN PROVIDES 10' CLEARANCE ABOVE A Q100 WATER ELEVATION OF 94.6'.
 4. LANDOWNER: WA DEPT. OF NATURAL RESOURCES
 5. LOCATION:
 MY-21 ROAD STATION 6+92 TO 7+42
 T28N R9E SEC 33
 N47.8660, W121.6531



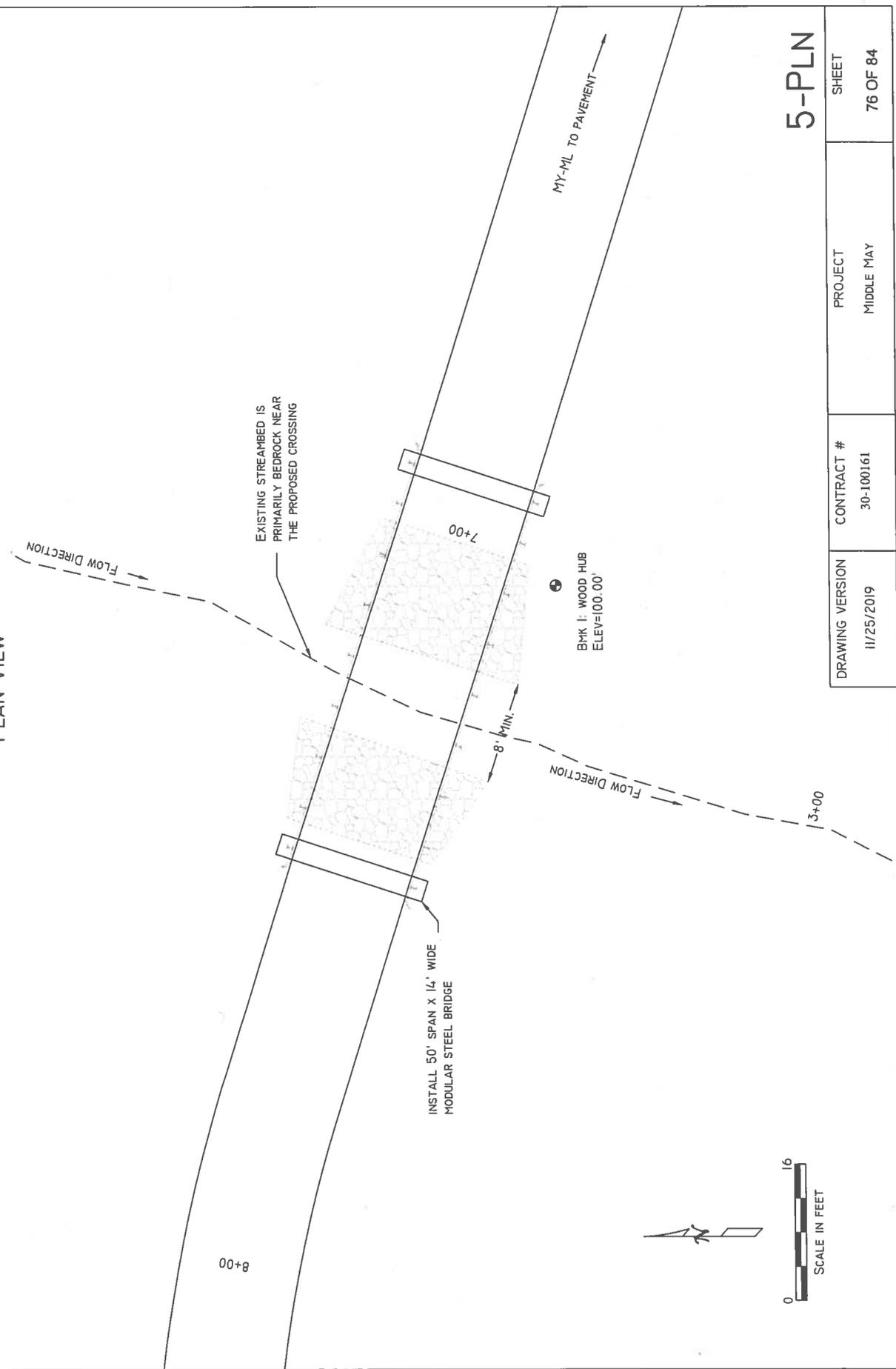
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2817340

BRIDGE SITE #5
 50'x14' MODULAR STEEL BRIDGE INSTALLATION
 MY-21 ROAD STATION 6+92 TO 7+42

PLAN VIEW



5-PLN
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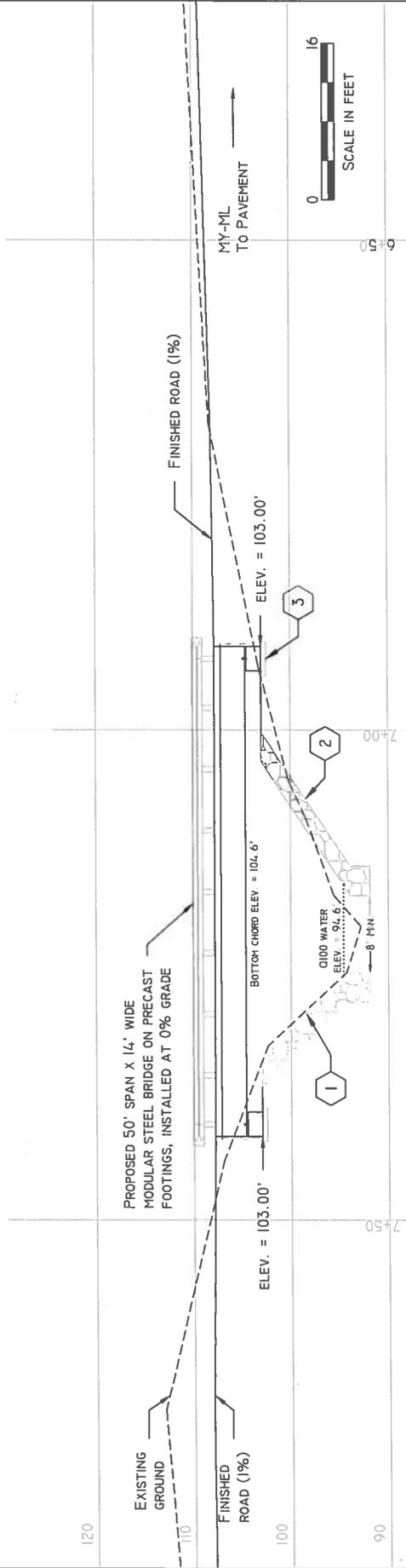
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 30-100161

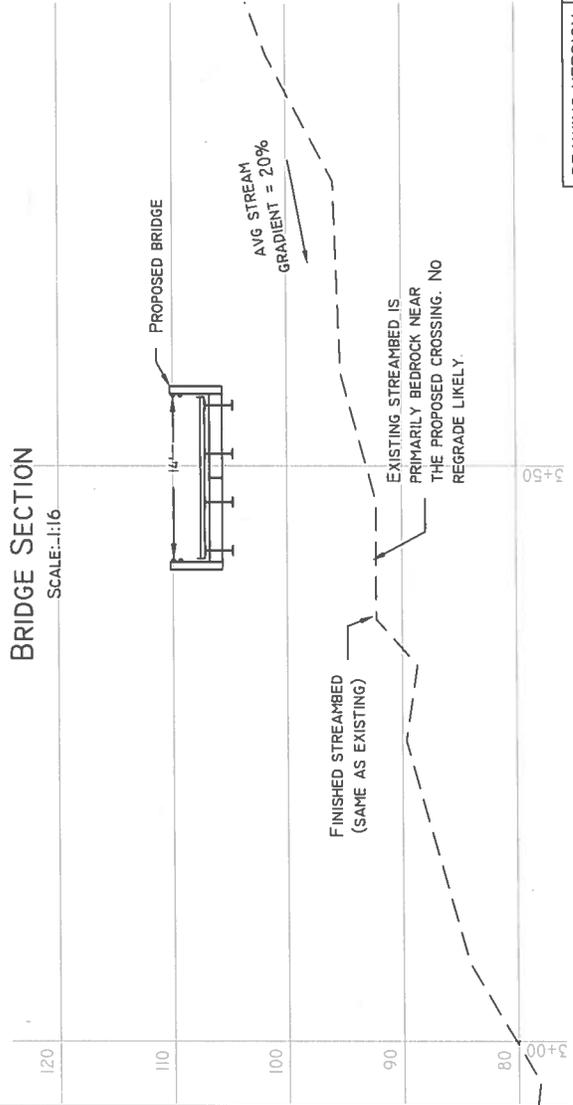
DRAWING VERSION
 11/25/2019

2817340

BRIDGE SITE #5
50'x14' MODULAR STEEL BRIDGE INSTALLATION
MY-21 ROAD STATION 6+92 TO 7+42
BRIDGE PROFILE - LOOKING UPSTREAM



BRIDGE SECTION
 SCALE: 1/16



CONSTRUCTION NOTES:

- ① FAR-SIDE BANK IS EXPECTED TO BE COMPOSED OF BEDROCK. IF COMPETENT ROCK IS NOT PRESENT, ARMOR BANK WITH RIPRAP
- ② 3-FOOT THICK RIPRAP ARMORING AT 1/2:1 SLOPE RATIO. TOE ELEVATION SHALL BE A MINIMUM OF 2' BELOW EXISTING STREAMBED. CONSTRUCT WITH A MIX OF LIGHT AND HEAVY LOOSE RIPRAP
- ③ OVEREXCAVATE 0.5' AND PLACE COMPACTED LAYER OF 1/2" MINUS CRUSHED ROCK AS LEVELING COURSE.

CREATE TEMPORARY EQUIPMENT CROSSING BY PLACING LOGS PARALLEL TO STREAM FLOW SO THAT EQUIPMENT TRACKS REMAIN ABOVE WATER WHILE CROSSING

5-PRO

DRAWING VERSION 11/25/2019	CONTRACT # 30-100161	PROJECT MIDDLE MAY	SHEET 77 OF 84
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TECHNICAL BRIDGE SPECIFICATIONS

PART B.1 – MATERIALS

B.1.1 STRUCTURAL STEEL

Structural Steel shall be ASTM Specification A-588 weathering steel. Structural Steel used as main load-carrying tension members or as tension components of flexural members shall be impact tested and shall have a minimum average Charpy V-notch (CVN) toughness of 25 ft-lb at 40°F.

Welded splices are prohibited in main load carrying members.

Mill Test Certificates shall be furnished for all structural steel members used in the fabrication of the bridge. Certified mill test reports for steel members with specified values shall include, in addition to other test results, the results of Charpy V-notch impact tests.

B.1.2 ELASTOMERIC BEARING PADS

Elastomeric bearing pads shall conform to the requirements of AASHTO M251.

PART B.2 – CONSTRUCTION REQUIREMENTS

B.2.1 STEEL BRIDGE FABRICATOR QUALIFICATIONS

Steel bridge fabricator shall be certified under the AISC Quality Certification Program, Certified Bridge Fabricator - Simple (SBR). When fracture critical members are included in the bridge, bridge fabricators shall also have a Fracture Critical Endorsement (FC), under the AISC Quality Certification Program.

B.2.2 STEEL WELDING AND INSPECTION

Welding and weld qualification tests shall conform to the provisions of the current edition of the AASHTO/AWS D1.5 Bridge Welding Code. No welding, including tack and temporary welds, shall be done in the shop or field unless location of the welds are shown on the approved shop drawings or otherwise approved by the State in writing. Purchaser shall provide State proof of welder certification prior to any field welding.

The Purchaser is responsible for non-destructive testing and welding inspection in accordance with, and as required by, AASHTO/AWS D1.5 Bridge Welding Code and as otherwise detailed in the Technical Specifications and Plans. Testing and inspection shall apply to welding performed both in the field and in the shop. After the purchaser's welding testing and inspection is complete, they shall provide copies of procedures, acceptance criteria, results, and inspector qualifications to the State within 48 hours of request.

B.2.3 STEEL SURFACE CLEANING AND PREPARATION

All surfaces of structural steel shall be blast cleaned in accordance with the Steel Structures Painting Council (SSPC), Surface Preparation Specification No. 6, latest edition, (SSPC-SP6), Commercial Blast.

B.2.4 STEEL GALVANIZING

All galvanizing must be done after fabrication and must be in accordance with AASHTO Designation M111-09 (ASTM Designation: A123) and/or AASHTO Designation M232-10 centrifuged to remove excess (ASTM Designation A153) and/or AASHTO M298-10 mechanical galvanization (ASTM B695-04). All bolts used to facilitate field assembly will be A325 Type 1 or 2 galvanized.

B.2.5 PRECAST CONCRETE FABRICATOR QUALIFICATIONS

Precast concrete fabricator shall be certified under the Precast/Prestressed Concrete Institute's (PCI) Plant Certification Program at a level equivalent or higher than B1 – Precast Bridge Products (No Prestressed Reinforcement).

PART B.3 – STRUCTURE DESIGN

B.3.1 PURCHASER'S DESIGN ENGINEER

All design work shall be completed by (or under the direct supervision of) a Professional Engineer, licensed in the State of Washington, in the branch of Civil or Structural Engineering.

B.3.2 DESIGN METHOD

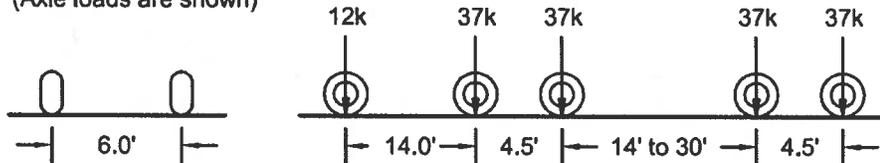
All design work shall be in conformance with the current edition of the AASHTO LRFD Bridge Design Specifications and all subsequent interim specifications. Design details not covered by the AASHTO Specifications shall be in accordance with normally accepted structural design standards.

B.3.3 DESIGN LOADING

Bridge and foundation shall be designed to HL-93 loading and U-80 special design vehicle with full impact (IM=33%).

U80 TRUCK LOADING - GVW = 80 TONS

(Axle loads are shown)



B.3.4 BRIDGE DESIGN – GENERAL

- A. Bridge shall have integral bridge rails, which shall be thrie-beam or W-Beam with steel posts and shall be designed for TL-1 force requirements in accordance with AASHTO LRFD Appendix A13.2. Bridge Rails are not required to be crash tested. All steel components shall be galvanized. End sections shall conform to WSDOT Standard Plan C-7a, Design C. Rail elements, backup plates, reducer sections, and end sections shall conform to A Guide to Standardized Highway Barrier Hardware published by AASHTO, AGC, and ARTBA. All rail elements shall be formed with minimum 12-gauge. The rail splices shall have a minimum total ultimate strength of 80,000 pounds at each joint. The edges of the rails shall be rolled or rounded so they present no sharp edges.
- B. Top of rail shall be a minimum of 27" above the top of the wearing surface.
- C. Bridge deck shall be continuous full width, with no gaps that allow water and sediment to drain through the bridge deck.
- D. Bridge components shall include functional lifting points to facilitate unloading and placement.

B.3.5 BRIDGE SUPERSTRUCTURE DESIGN – MODULAR STEEL

Bridge superstructure members must meet or exceed the following parameters:

- A. The superstructure shall be a modular design consisting of steel girders and a deck system composed of either precast concrete panels or galvanized corrugated steel with gravel wearing surface.
- B. Bridge shall have endwalls composed of either galvanized steel or precast concrete panels.
- C. Vehicle load deflection limit of $L/500$ calculated in accordance with AASHTO LRFD Section 3.6.1.3.2.
- D. Concrete components of this bridge including, but not limited to, deck, endwalls, and curbs shall be constructed of reinforced concrete with a minimum 28-day compressive strength of 4,000 psi.
- E. Concrete design shall include specifications for:
 - i. Required concrete strength at release and at 28 days.
 - ii. Maximum slump of concrete.
 - iii. Air content of concrete.
 - iv. Reinforcing steel size, grade, and coating if applicable.

B.3.6 BRIDGE SUPERSTRUCTURE DESIGN – CONCRETE SLAB

Bridge superstructure members must meet or exceed the following parameters:

- A. All manufactured components of this bridge including, but not limited to, girders, deck, wingwalls, endwalls, and curbs shall be constructed of reinforced concrete with a minimum 28-day compressive strength of 4,000 psi.
- B. LRFD Article 2.5.2.6.2 – Criteria for Deflection shall be considered required. Vehicle load deflection limit of $L/800$ shall apply.
- C. Design shall include specifications for:
 - i. Required concrete strength at release and at 28 days.
 - ii. Maximum slump of concrete.
 - iii. Air content of concrete.
 - iv. Reinforcing steel size, grade, and coating if applicable.

B.3.7 BRIDGE FOUNDATION DESIGN – SPREAD FOOTING

The foundation shall meet or exceed the parameters outlined below.

- A. Foundation shall consist of pre-cast concrete spread footings, sized to meet design elevations shown on the plans.
- B. All non-galvanized steel members that may come into contact with soil shall be painted with an anti-corrosion coating.
- C. Nominal bearing resistance of the soil is assumed to be 4,000 pounds per square foot.
- D. Design of pre-cast components provided by Purchaser's Engineer shall include specifications for:
 - i. Required concrete strength at release.
 - ii. Required concrete strength for transport.
 - iii. Required concrete strength for exposure to construction loads.
 - iv. Required concrete strength at 28 days.
 - v. Reinforcing steel configuration, size, grade, and coating if applicable.

B.3.8 BRIDGE FOUNDATION DESIGN – TOWER AND PAD FOOTING

The foundation shall meet or exceed the parameters outlined below.

- A. Foundation shall be consist of pre-cast concrete spread footings with steel tower assembly extending to bridge elevation.
- B. All non-galvanized steel members that may come into contact with soil shall be painted with an anti-corrosion coating.
- C. The abutment connections shall be per the bridge manufacturer's written instructions or as designed by the Purchaser's engineer.
- D. Nominal bearing resistance of the soil is assumed to be 4,000 pounds per square foot.
- E. Design of pre-cast components provided by Purchaser's Engineer shall include specifications for:
 - i. Required concrete strength at release.
 - ii. Required concrete strength for transport.
 - iii. Required concrete strength for exposure to construction loads.
 - iv. Required concrete strength at 28 days.
 - v. Reinforcing steel configuration, size, grade, and coating if applicable.

B.3.9 BRIDGE FOUNDATION DESIGN – PRECAST BLOCK ABUTMENT

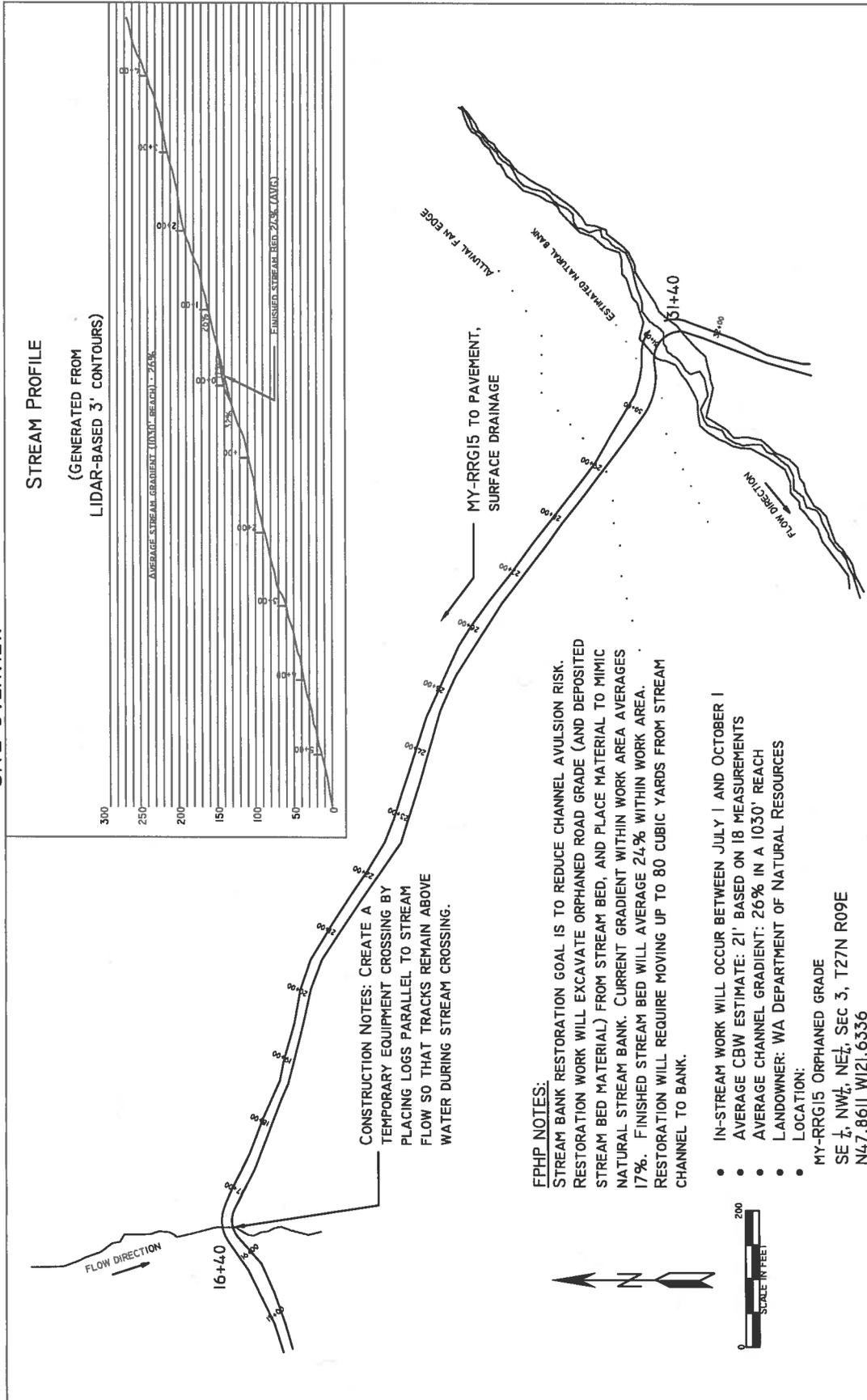
Abutment wall shall consist of Ultrablock®-style precast concrete blocks. Bridge shall include precast spread footings firmly attached to abutment walls. Blocks shall meet or exceed the parameters outlined below.

- A. Concrete shall have 28-day compressive strength of at least 2,200 psi and shall be air entrained 4-7% to protect the surface from freeze thaw degradation.
- B. Blocks shall be cast monolithically, no cold joints allowed.
- C. All exposed surfaces shall have a smooth finish.
- D. Block size shall be 2.5 feet wide x 2.5 feet deep x 5 feet long. Dimensional tolerance shall be ½-inch for length, width, and height.
- E. Edges shall be chamfered.
- F. Blocks shall interlock with a shear key system.
- G. Each block shall include a satisfactory embedded lifting device.

STREAM BANK RESTORATION DETAIL

MY-RRG15 ORPHANED ROAD GRADE -- STATION 30+60 TO 31+40

SITE OVERVIEW



CONSTRUCTION NOTES: CREATE A TEMPORARY EQUIPMENT CROSSING BY PLACING LOGS PARALLEL TO STREAM FLOW SO THAT TRACKS REMAIN ABOVE WATER DURING STREAM CROSSING.

FRPH NOTES:

STREAM BANK RESTORATION GOAL IS TO REDUCE CHANNEL AVULSION RISK. RESTORATION WORK WILL EXCAVATE ORPHANED ROAD GRADE (AND DEPOSITED STREAM BED MATERIAL) FROM STREAM BED, AND PLACE MATERIAL TO MIMIC NATURAL STREAM BANK. CURRENT GRADIENT WITHIN WORK AREA AVERAGES 17%. FINISHED STREAM BED WILL AVERAGE 2.4% WITHIN WORK AREA. RESTORATION WILL REQUIRE MOVING UP TO 80 CUBIC YARDS FROM STREAM CHANNEL TO BANK.

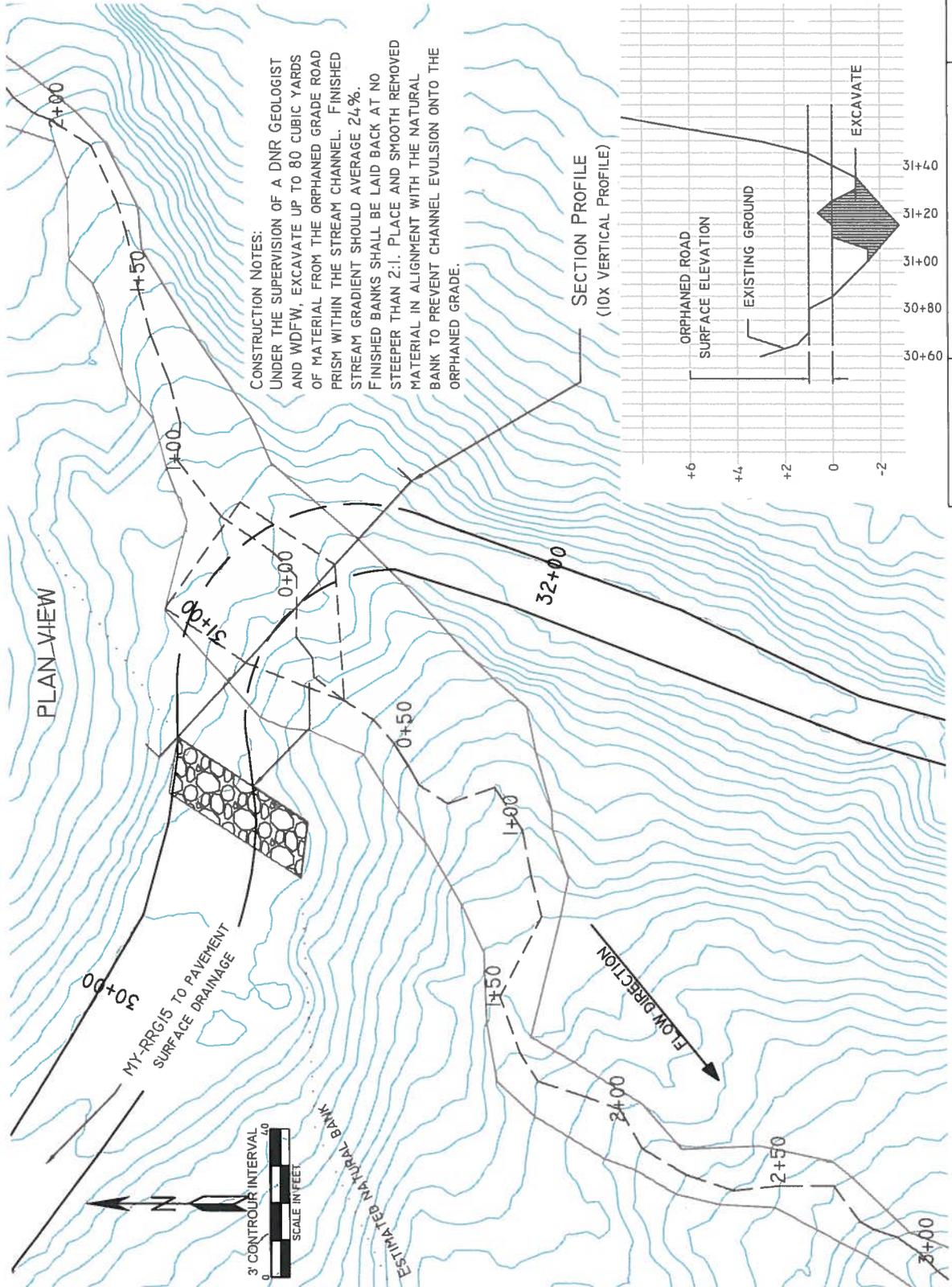
- IN-STREAM WORK WILL OCCUR BETWEEN JULY 1 AND OCTOBER 1
- AVERAGE CBW ESTIMATE: 21' BASED ON 18 MEASUREMENTS
- AVERAGE CHANNEL GRADIENT: 2.6% IN A 1030' REACH
- LANDOWNER: WA DEPARTMENT OF NATURAL RESOURCES
- LOCATION:

MY-RRG15 ORPHANED GRADE
 SE 1/4, NW 1/4, NE 1/4, SEC 3, T27N R09E
 N47.8611 W121.6336

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STREAM BANK RESTORATION DETAIL

MY-RRG15 ORPHANED ROAD GRADE STATION 30+60 TO 31+40



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30-100161

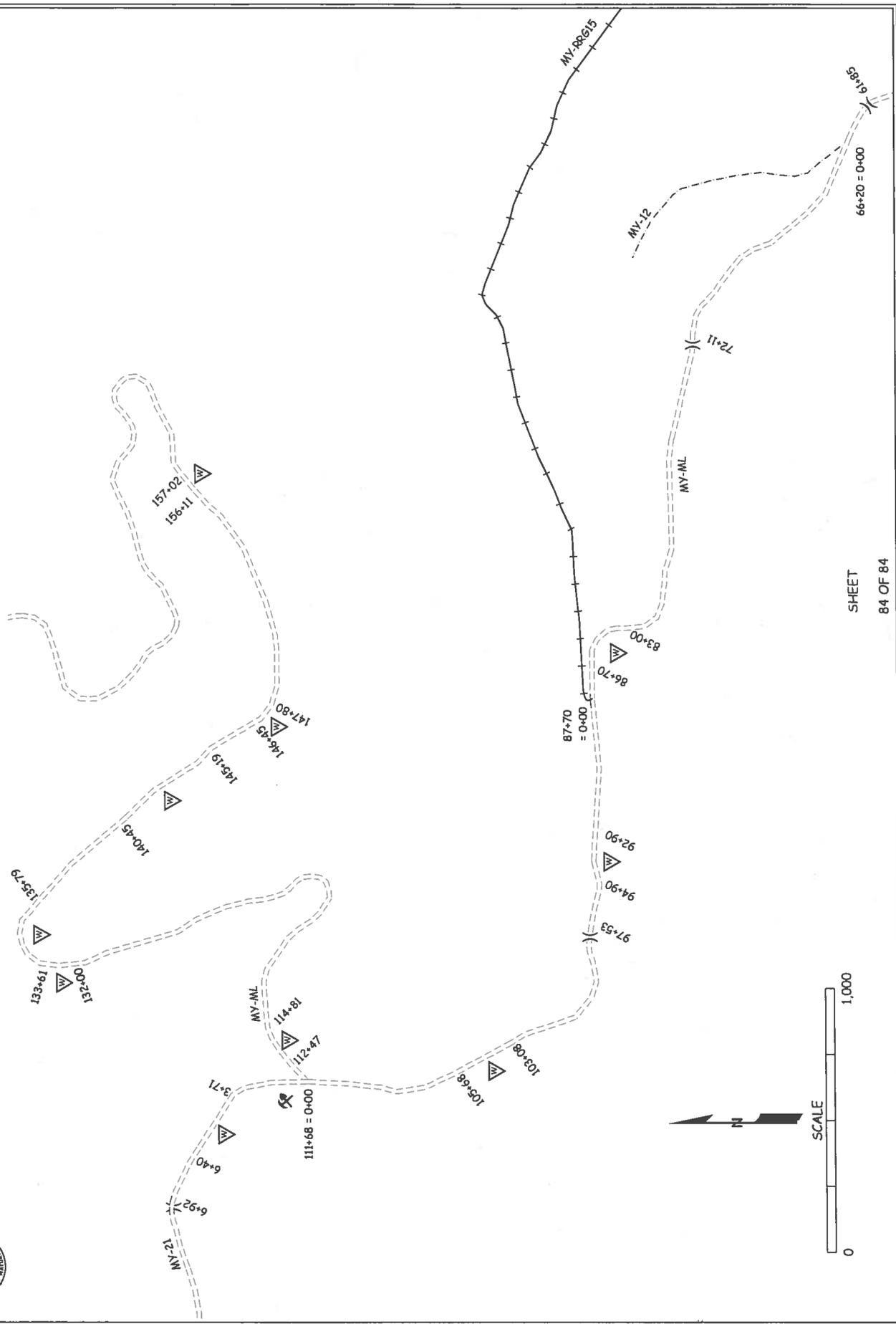
PROJECT
MIDDLE MAY

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MIDDLE MAY TIMBER SALE DESIGNATED WASTE AREAS

WASHINGTON STATE
DEPT. OF NATURAL RESOURCES
NORTHWEST REGION



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