



**TIMBER NOTICE OF SALE**

**SALE NAME:** GREENSTONE

**AGREEMENT NO:** 30-106183

**AUCTION:** December 18, 2024 starting at 10:00 a.m., **COUNTY:** Skagit  
Northwest Region Office, Sedro Woolley, WA

**SALE LOCATION:** Sale located approximately 11 miles southeast of Mount Vernon, WA.

**PRODUCTS SOLD  
AND SALE AREA:**

All timber bounded by white timber sale boundary tags and the BR-3802 Road, except cedar salvage (cedar snags, preexisting dead and down cedar trees and cedar logs), trees marked with blue paint on the bole and root collar, and forest products tagged out by yellow leave tree area tags in Unit #1 (collectively labeled 1A and 1B).

All timber bounded by white timber sale boundary tags, except cedar salvage (cedar snags, preexisting dead and down cedar trees and cedar logs), trees marked with blue paint on the bole and root collar, and forest products tagged out by yellow leave tree area tags in Unit #2 (collectively labeled 2A, 2B and 2C), Unit #3 and Unit #8.

All timber bounded by white timber sale boundary tags and the BR-ML Road, except cedar salvage (cedar snags, preexisting dead and down cedar trees and cedar logs), trees marked with blue paint on the bole and root collar, and forest products tagged out by yellow leave tree area tags in Unit #4.

All timber bounded by white timber sale boundary tags and the BR-ML, BR-63 and BR-6301 roads, except cedar salvage (cedar snags, preexisting dead and down cedar trees and cedar logs), trees marked with blue paint on the bole and root collar, and forest products tagged out by yellow leave tree area tags in Unit #5.

All timber bounded by white timber sale boundary tags and adjacent young stand, except cedar salvage (cedar snags, preexisting dead and down cedar trees and cedar logs), trees marked with blue paint on the bole and root collar, and forest products tagged out by yellow leave tree area tags in Unit #6.

All timber bounded by white timber sale boundary tags and the BR-63 Road, except cedar salvage (cedar snags, preexisting dead and down cedar trees and cedar logs), trees marked with blue paint on the bole and root collar, and forest products tagged out by yellow leave tree area tags in Unit #7 (collectively labeled 7A, 7B, 7C and 7D).

All timber bounded by orange right-of-way tags and all timber within 30 feet of centerline of roads to be constructed.

All forest products above located on part(s) of Sections 6 all in Township 33 North, Range 6 East, Sections 1 and 2 all in Township 33 North, Range 5 East, Sections 35 and 36 all in Township 34 North, Range 5 East, W.M., containing 158 acres, more or less.

**CERTIFICATION:** This sale is certified under the Sustainable Forestry Initiative® program Standard (cert no: BVC-SFIFM-018227)



TIMBER NOTICE OF SALE

ESTIMATED SALE VOLUMES AND QUALITY:

Species	Avg Ring DBH Count	Total MBF	MBF by Grade									
			1P	2P	3P	SM	1S	2S	3S	4S	UT	
Hemlock	15.2	4,388							1,663	2,232	448	45
Silver fir	15.5	615							198	338	78	1
Douglas fir	21.2	295							181	104	10	
Redcedar	18.1	287								251	36	
Red alder	17.2	34							11	7	8	8
Sale Total		5,619										

MINIMUM BID: \$1,011,000.00

BID METHOD: Sealed Bids

PERFORMANCE SECURITY: \$100,000.00

SALE TYPE: Lump Sum

EXPIRATION DATE: March 31, 2028

ALLOCATION: Export Restricted

BID DEPOSIT: \$101,100.00 or Bid Bond. Said deposit shall constitute an opening bid at the appraised price.

HARVEST METHOD: Cable OR tethered equipment (See below for restrictions); shovel, "6-wheeled rubber-tired skidders with over-the-tire tracks spanning both sets of rear tires" (See below for restrictions), rubber-tired skidder (See below for restrictions) or tracked equipment on sustained slopes 35% or less; self-leveling equipment on sustained slopes 50% or less (See below for restrictions).

Prior written approval of the Contract Administrator is required before tethered or self-leveling equipment may be used. If ground disturbance is causing excessive damage, as determined by the Contract Administrator, the use of this equipment will no longer be authorized.

Purchaser must obtain prior written approval from the Contract Administrator for areas as to where "6 wheeled rubber tired skidders with over-the-tire tracks spanning both sets of rear tires" or rubber-tired skidder can operate. If ground disturbance is causing excessive damage, as determined by the Contract Administrator, the equipment will no longer be authorized. Falling and Yarding will not be permitted from November 1 to March 31 unless authorized in writing by the Contract Administrator (THIS PERTAINS TO GROUND-BASED EQUIPMENT ONLY) to reduce soil damage and erosion.

ROADS: 94.87 stations of required construction. 58.27 stations of required reconstruction. 22.04 stations of optional construction. 17.84 stations of optional reconstruction. 661.67 stations of required prehaul maintenance. 17.84 stations of abandonment. 22.04 stations of abandonment, if built.

Rock may be obtained from the following sources on State land at no charge to the Purchaser: West Bear Pit at station 20+02 of the BR-3802-05 Road. Mid Bear Pit at station 5+75 of the BR-59 Road. Greenstone Pit at station 4+60 of the BR-6307 Road.

Development of new and existing rock sources will involve stripping, drilling, shooting, and processing rock to generate riprap, shot rock, 2-inch-minus crushed rock and 3-inch-minus ballast rock.



## TIMBER NOTICE OF SALE

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An estimated total quantity of rock needed for this proposal: 632 cubic yards of riprap, 40 cubic yards shot rock, 1,340 cubic yards crushed rock and 15,990 cubic yards of ballast rock.

Road work and the hauling of rock will not be permitted from November 1 to March 31 unless authorized in writing by the Contract Administrator to reduce soil damage and siltation. The hauling of forest products will not be permitted from November 1 to March 31 unless authorized in writing by the Contract Administrator to reduce soil damage and siltation.

### **ACREAGE DETERMINATION**

**CRUISE METHOD:** Acres determined by GPS traverse. Cruise was conducted via variable plot sample type. See Cruise Narrative for further details. Shapefiles of units are available upon request, and on the DNR website after the BNR meeting in which the sale is presented.

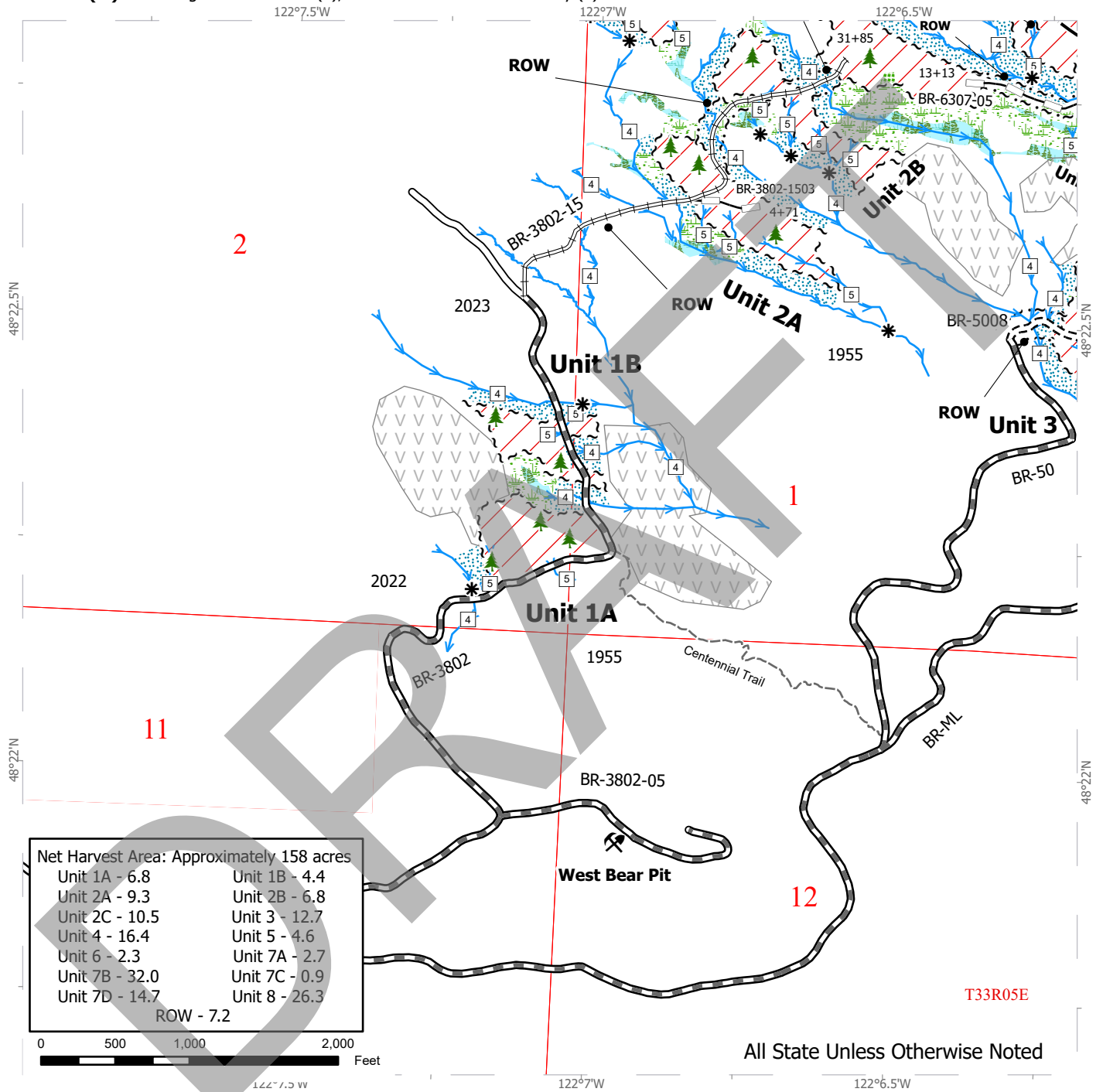
**FEES:** \$95,523.00 is due on day of sale. \$9.00 per MBF is due upon removal. These are in addition to the bid price.

**SPECIAL REMARKS:** Redcedar poles were noted within the sale area.

# TIMBER SALE MAP

**SALE NAME:** GREENSTONE  
**AGREEMENT #:** 30-106183  
**TOWNSHIP(S):** T33R5E, T34R5E  
**TRUST(S):** Agricultural School (4), Common School and Indemnity (3)

**REGION:** Northwest Region  
**COUNTY(S):** Skagit  
**ELEVATION RGE:** 2000-2920

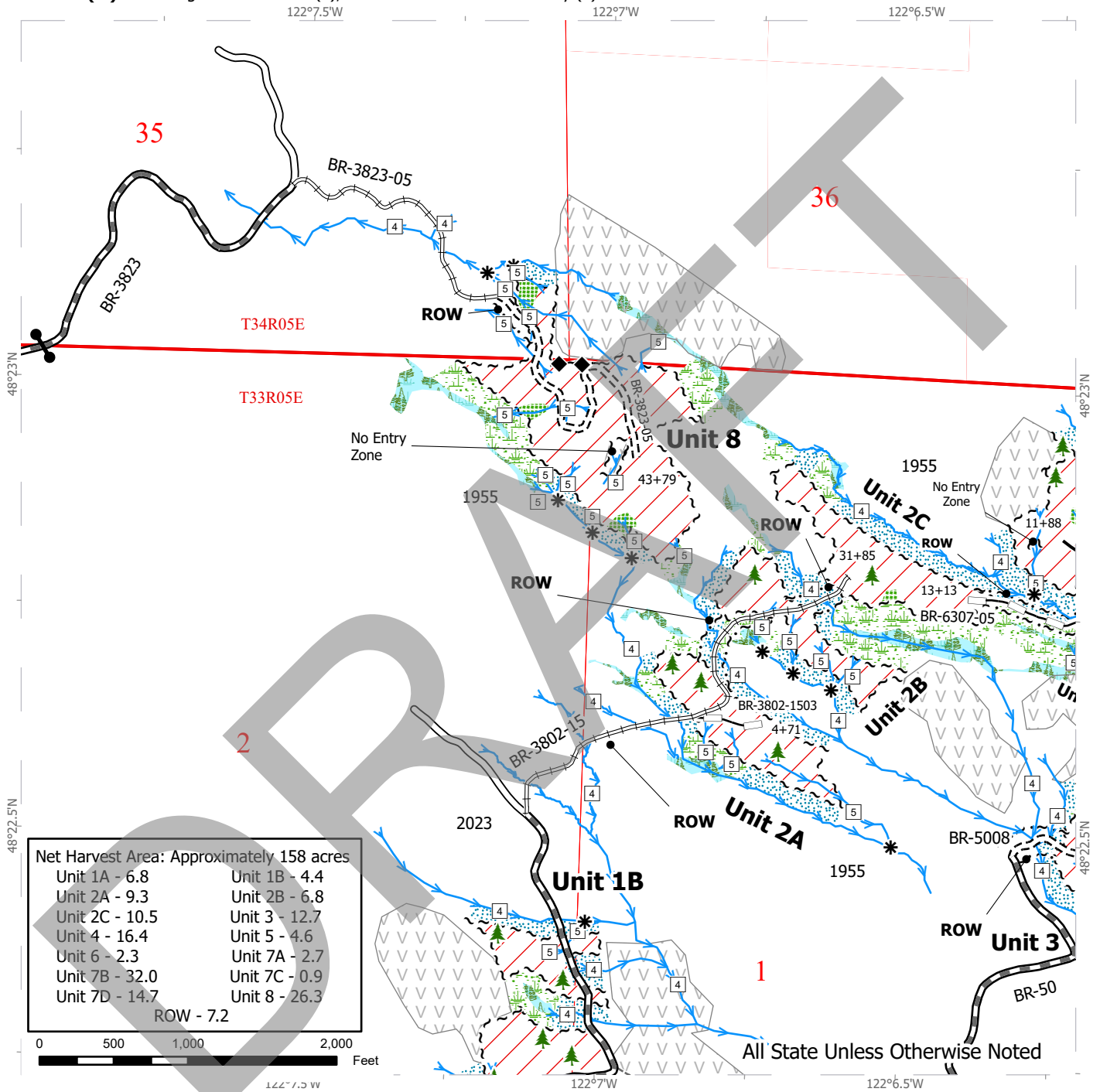


Variable Retention Harvest	Existing Roads	Sale Boundary Tags
Leave Tree Area	Required Pre-Haul Maintenance	Right of Way Tags
Forested Wetland	Required Construction	Recreational Trail
Wetland Mgt Zone	Required Reconstruction	Streams
Riparian Mgt Zone	Optional Construction	Leave Tree Area <1/4-acre
No Entry Zone	Optional Reconstruction	Rock Pit
	Stream Type	
	Stream Break	

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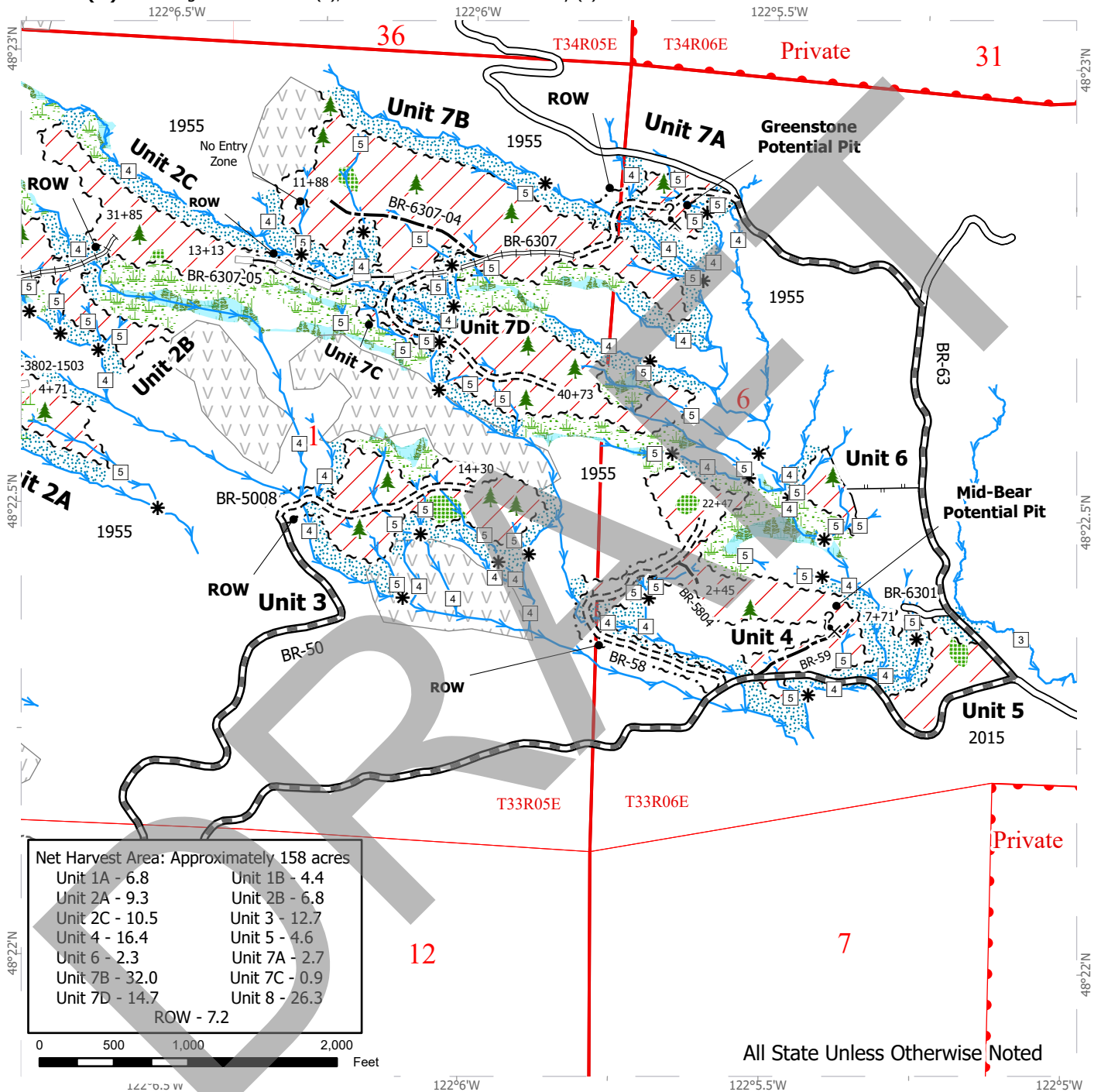


Variable Retention Harvest	Existing Roads	Sale Boundary Tags
Leave Tree Area	Required Pre-Haul Maintenance	Right of Way Tags
Forested Wetland	Required Construction	Streams
Wetland Mgt Zone	Required Reconstruction	Leave Tree Area <1/4-acre
Riparian Mgt Zone	Optional Construction	Gate (F1-3)
No Entry Zone	Optional Reconstruction	Survey Monument
	Stream Type	
	Stream Break	

# TIMBER SALE MAP

**SALE NAME:** GREENSTONE  
**AGREEMENT #:** 30-106183  
**TOWNSHIP(S):** T33R5E, T34R5E  
**TRUST(S):** Agricultural School (4), Common School and Indemnity (3)

**REGION:** Northwest Region  
**COUNTY(S):** Skagit  
**ELEVATION RGE:** 2000-2920



Net Harvest Area: Approximately 158 acres

Unit 1A - 6.8	Unit 1B - 4.4
Unit 2A - 9.3	Unit 2B - 6.8
Unit 2C - 10.5	Unit 3 - 12.7
Unit 4 - 16.4	Unit 5 - 4.6
Unit 6 - 2.3	Unit 7A - 2.7
Unit 7B - 32.0	Unit 7C - 0.9
Unit 7D - 14.7	Unit 8 - 26.3
ROW - 7.2	

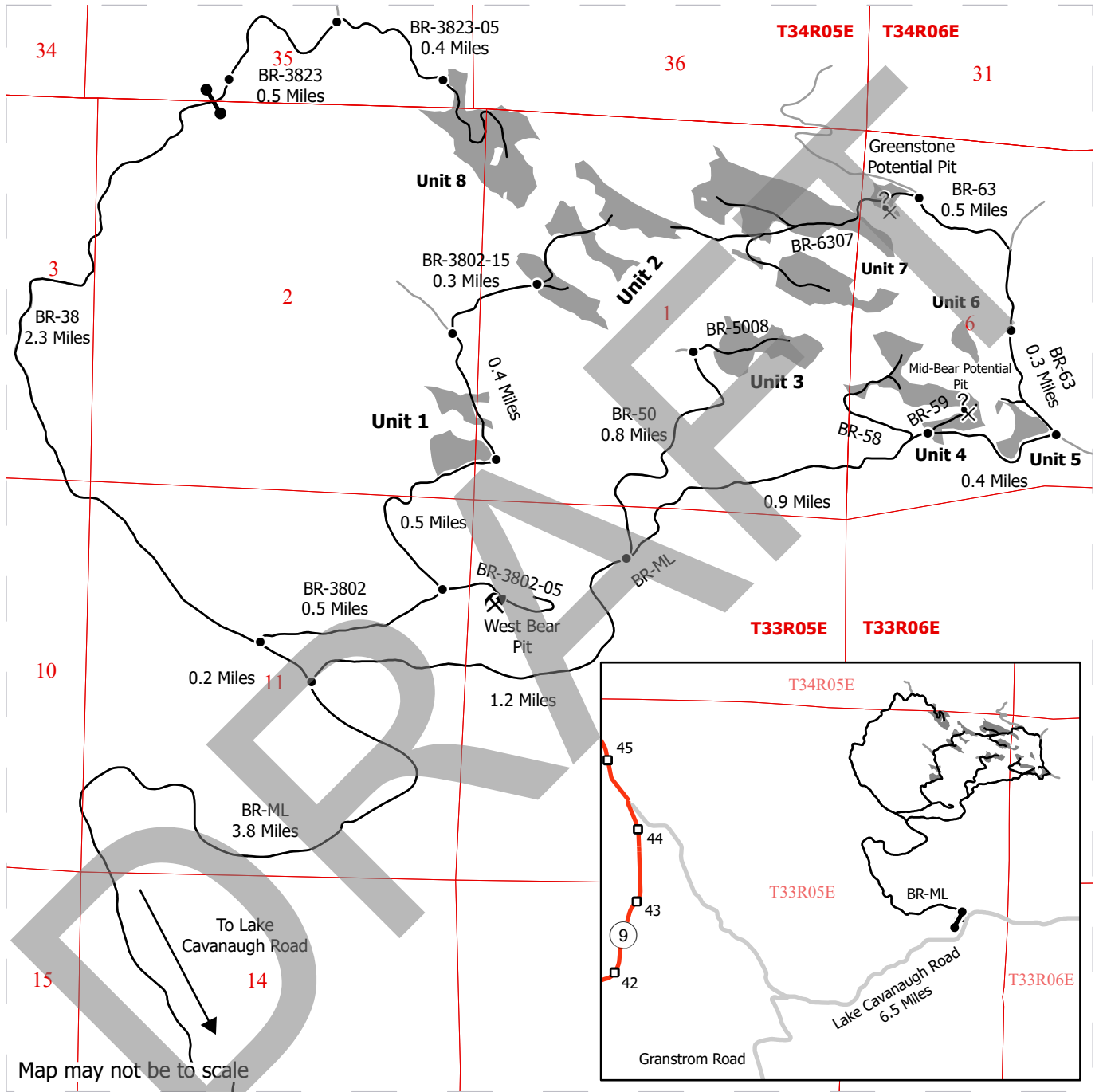
All State Unless Otherwise Noted

Variable Retention Harvest	Existing Roads	Sale Boundary Tags
Leave Tree Area	Required Pre-Haul Maintenance	Right of Way Tags
Forested Wetland	Required Construction	Timber Type Change
Wetland Mgt Zone	Required Reconstruction	Centennial Trail
Riparian Mgt Zone	Optional Construction	Streams
No Entry Zone	Optional Reconstruction	Leave Tree Area <1/4-acre
Stream Type	Designated Skid Trail	Potential Rock Source
Stream Break		

# DRIVING MAP

**SALE NAME:** GREENSTONE  
**AGREEMENT #:** 30-106183  
**TOWNSHIP(S):** T33R5E, T33R6E, T34R5E  
**TRUST(S):** Agricultural School (4), Common School and Indemnity (3)

**REGION:** Northwest Region  
**COUNTY(S):** Skagit  
**ELEVATION RGE:** 2000-2920



Map may not be to scale

- Harvest Unit
- Highway
- Haul Route
- Other Route
- Distance Indicator
- Gate (F1-3)
- Rock Pit
- Potential Rock Source

**DRIVING DIRECTIONS:**

From the junction of Highway 20 and Highway 9 in Sedro-Woolley, travel south 11.6 miles on Highway 9 to Lake Cavanaugh Road. Travel east on Lake Cavanaugh Road for 6.5 miles to the BR-ML gate on the north side of the road.  
 Unit 1 - From the BR-ML gate, travel 3.8 miles on the BR-ML to the BR-ML and BR-38 junction. Travel 0.2 miles on the BR-38 then turn east on BR-3802 for 1.0 miles. Unit 2 - Continue 0.4 miles past unit 1 to the BR-3802-15, follow for 0.3 miles to Unit 2. Unit 3 - From the BR-ML - BR-38 intersection, follow the BR-ML 1.2 miles, turn left onto the BR-50 road. Follow for 0.8 miles to the BR-5008, follow for 0.1 miles to Unit 3. Unit 4 - From the BR-ML - BR-50 intersection, continue on the BR-ML 0.9 miles to Unit 4. Unit 5 - Stay on the BR-ML another 0.4 miles to Unit 5. Unit 6 - From the BR-ML - BR-63 road intersection take the BR-63 0.3 miles to Unit 6. Unit 7- Continue on the BR-63 road 0.5 miles to Unit 7. Unit 8 - from the BR-ML - BR 38 road intersection, follow the BR-38 2.5 miles, turn onto the BR-3823 road continue 0.5 miles to the BR-3823-05 road, follow 0.4 miles to Unit 8.



## Timber Sale Cruise Report Greenstone - NW

**Sale Name:** GREENSTONE

**Sale Type:** LUMP SUM

**Region:** NORTHWEST

**District:** CLEAR LAKE

**Lead Cruiser:** Matt Llobet

**Other Cruisers:** Bailey Vos

**Cruise Narrative:**

My total net volume for Greenstone is 5,620 MBF. The Greenstone TS consisted of a uniform stocking with western hemlock and pacific silver fir being the dominant species. This sale showed signs of good health throughout all units.

**Cruise Design**

112 variable radius plots were installed, measuring 486 trees. Approximately 1 plot per 1.4 acre was sampled throughout the sale (see TS unit cruise design on report). The smallest merchantable tree cruised had a DBH of 7.0 inches and 5.0 inches at 16 feet. A relaskop and laser was used for tree heights. Sample points were generated in GIS and located out in the field using Avenza Maps.

**Log Lengths**

Log segments were cruised to maximize sawlog recovery - while considering preferred west-side lengths.

**Logging and Stand Conditions**

Approximately 100% of the sale is ground base harvest. Throughout the parcel productive operator ground was observed.

**General Remarks**

The stand characteristics throughout the sale showed uniformly stocked, "plantation-style" western hemlock and pacific silver fir in the small-medium diameter range. Greenstone cruised out at 35,609 BF per acre and all live timber showed excellent form. The WH and PSF made up 89% of the sale volume. Pole quality WRC was cruised throughout the sale amounting to 100 MBF. The majority of the WRC pole volume was cruised in distribution lengths.

**Timber Sale Notice Volume (MBF)**

Sp	DBH	Rings/In	Age	MBF Volume by Grade				
				All	2 Saw	3 Saw	4 Saw	Utility
WH	15.2			4,388	1,663	2,232	448	45
SF	15.5			615	198	338	78	0
DF	21.2			295	181	104	10	
RC	18.1			287		251	36	
RA	17.2			34	11	7	8	7
ALL	15.5			5,619	2,054	2,931	581	52



**Timber Sale Notice Weight (tons)**

Sp	Tons by Grade				
	All	2 Saw	3 Saw	4 Saw	Utility
WH	37,768	13,012	19,936	4,533	287
SF	4,838	1,462	2,688	684	4
RC	2,687		2,306	381	
DF	2,294	1,294	900	101	
RA	268	78	52	90	48
ALL	47,855	15,846	25,882	5,789	339

**Timber Sale Overall Cruise Statistics**

BA (sq ft/acre)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR SE (%)	Net Vol (bf/acre)	Vol SE (%)
299.7	3.3	117.6	1.5	35,609	3.6

**Timber Sale Unit Cruise Design**

Unit	Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
GREENSTONE 1A	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	6.8	7.0	5	5	0
GREENSTONE 1B	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	4.4	5.0	5	5	0
GREENSTONE 2A	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	9.3	9.8	4	4	0
GREENSTONE 2B	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	6.8	7.4	4	4	0
GREENSTONE 2C	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	10.6	10.8	5	5	0
GREENSTONE 3	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 0 ft	12.7	14.0	8	8	0
GREENSTONE 4	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 0 ft	16.4	17.2	11	11	0
GREENSTONE 5	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 0 ft	4.6	5.0	4	4	0

Unit	Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
GREENSTONE 6	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 0 ft	2.3	2.4	1	1	0
GREENSTONE 7A	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	2.7	2.9	2	2	0
GREENSTONE 7B	B2C: VR, 2 BAF (54.44, 40 for some species) Measure/Count Plots, Sighting Ht = 4.5 ft	32.1	33.9	21	12	0
GREENSTONE 7C	B1: VR, 1 BAF (54.44) Measure All, Sighting Ht = 4.5 ft	0.9	0.9	2	2	0
GREENSTONE 7D	B2C: VR, 2 BAF (62.5, 40 for some species) Measure/Count Plots, Sighting Ht = 4.5 ft	14.7	15.0	9	5	0
GREENSTONE 8	B2C: VR, 2 BAF (54.44, 40 for some species) Measure/Count Plots, Sighting Ht = 4.5 ft	26.3	27.8	17	9	0
GREENSTONE ROW	B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	7.2	7.0	14	14	0
All		157.8	166.1	112	91	0

### Timber Sale Log Grade x Sort Summary

Sp	Status	Grade	Sort	Dia	Len	BF Gross	BF Net	Defect %	Tons	MBF Net
DF	LIVE	2 SAW	Domestic	15.3	39	1,178	1,148	2.5	1,293.7	181.2
DF	LIVE	3 SAW	Domestic	9.4	33	600	590	1.7	825.9	93.1
DF	LIVE	3 SAW	Pole	12.1	32	66	66	0.0	73.8	10.4
DF	LIVE	4 SAW	Domestic	7.2	25	47	47	0.0	74.4	7.5
DF	LIVE	4 SAW	Pole	8.3	24	19	19	0.0	26.5	2.9
DF	LIVE	CULL	Cull	20.4	6	17	0	100.0	0.0	0.0
RA	LIVE	2 SAW	Domestic	13.0	30	76	73	4.3	78.1	11.5
RA	LIVE	3 SAW	Domestic	11.0	30	44	43	1.5	52.3	6.8
RA	LIVE	4 SAW	Domestic	7.9	25	56	54	4.5	89.5	8.5
RA	LIVE	CULL	Cull	11.5	15	26	0	100.0	0.0	0.0
RA	LIVE	UTILITY	Pulp	12.6	23	46	46	0.0	47.9	7.2
RC	LIVE	3 SAW	Domestic	9.6	36	1,011	992	1.9	1,605.1	156.5
RC	LIVE	3 SAW	Pole	11.8	31	597	597	0.0	700.7	94.2
RC	LIVE	4 SAW	Domestic	6.2	26	202	194	4.1	329.2	30.6
RC	LIVE	4 SAW	Pole	8.1	25	34	34	0.0	52.2	5.3
RC	LIVE	CULL	Cull	10.2	11	53	0	100.0	0.0	0.0

Sp	Status	Grade	Sort	Dia	Len	BF Gross	BF Net	Defect %	Tons	MBF Net
SF	LIVE	2 SAW	Domestic	14.5	38	1,293	1,258	2.8	1,461.7	198.4
SF	LIVE	3 SAW	Domestic	9.1	34	2,148	2,143	0.2	2,688.5	338.2
SF	LIVE	4 SAW	Domestic	5.8	24	497	497	0.0	684.1	78.4
SF	LIVE	CULL	Cull	16.0	12	10	0	100.0	0.0	0.0
SF	LIVE	UTILITY	Pulp	6.5	22	2	2	0.0	3.9	0.4
WH	LIVE	2 SAW	Domestic	14.1	36	10,657	10,541	1.1	13,012.1	1,663.4
WH	LIVE	3 SAW	Domestic	8.5	35	14,244	14,145	0.7	19,935.8	2,232.1
WH	LIVE	4 SAW	Domestic	6.2	23	2,841	2,837	0.1	4,532.6	447.7
WH	LIVE	CULL	Cull	14.8	9	188	0	100.0	0.0	0.0
WH	LIVE	UTILITY	Pulp	9.4	17	284	284	0.0	287.3	44.8

### Timber Sale Log Sort x Diameter Bin Summary

Sp	Bin	Status	Sort	Dia	Len	BF Net	Defect %	Tons	MBF Net
DF	5 - 7	LIVE	Domestic	7.0	30	157	0.7	238.5	24.8
DF	8 - 11	LIVE	Pole	8.3	24	19	0.0	26.5	2.9
DF	8 - 11	LIVE	Domestic	10.3	34	454	1.4	598.2	71.7
DF	12 - 15	LIVE	Pole	12.1	32	66	0.0	73.8	10.4
DF	12 - 15	LIVE	Domestic	14.0	37	701	2.5	849.3	110.6
DF	16 - 19	LIVE	Domestic	17.3	39	473	3.0	508.2	74.7
DF	20+	LIVE	Cull	20.4	6	0	100.0	0.0	0.0
RA	5+	LIVE	Cull	9.1	16	0	100.0	0.0	0.0
RA	5+	LIVE	Domestic	9.6	27	169	3.7	220.0	26.7
RA	5+	LIVE	Pulp	12.2	24	46	0.0	47.9	7.2
RC	5+	LIVE	Domestic	7.9	32	1,185	2.3	1,934.3	187.1
RC	5+	LIVE	Cull	10.3	11	0	100.0	0.0	0.0
RC	5+	LIVE	Pole	10.5	31	631	0.0	752.9	99.5
SF	5 - 7	LIVE	Domestic	6.0	25	667	0.0	926.4	105.2
SF	5 - 7	LIVE	Pulp	6.5	22	2	0.0	3.9	0.4
SF	8 - 11	LIVE	Domestic	9.6	34	1,944	0.1	2,405.0	306.8
SF	12 - 15	LIVE	Domestic	13.9	38	899	3.0	1,094.1	141.9
SF	16 - 19	LIVE	Cull	16.0	12	0	100.0	0.0	0.0
SF	16 - 19	LIVE	Domestic	17.0	40	388	2.7	408.8	61.2
WH	5 - 7	LIVE	Pulp	5.2	14	25	0.0	25.5	4.0
WH	5 - 7	LIVE	Domestic	6.4	28	7,115	0.1	10,999.7	1,122.7
WH	8 - 11	LIVE	Domestic	9.8	35	9,868	0.9	13,468.7	1,557.1
WH	8 - 11	LIVE	Pulp	10.5	24	114	0.0	125.8	17.9
WH	8 - 11	LIVE	Cull	10.7	9	0	100.0	0.0	0.0

Sp	Bin	Status	Sort	Dia	Len	BF Net	Defect %	Tons	MBF Net
WH	12 - 15	LIVE	Domestic	13.5	37	7,464	1.3	9,671.1	1,177.8
WH	12 - 15	LIVE	Cull	14.6	10	0	100.0	0.0	0.0
WH	16 - 19	LIVE	Pulp	17.0	16	145	0.0	136.0	22.9
WH	16 - 19	LIVE	Domestic	17.1	38	2,478	0.7	2,753.9	391.0
WH	16 - 19	LIVE	Cull	18.2	7	0	100.0	0.0	0.0
WH	20+	LIVE	Cull	20.2	16	0	100.0	0.0	0.0
WH	20+	LIVE	Domestic	21.7	39	600	0.6	587.1	94.6

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## Cruise Unit Report GREENSTONE 1A

### Unit Sale Notice Volume (MBF): GREENSTONE 1A

Sp	DBH	Rings/In	Age	MBF Volume by Grade			
				All	2 Saw	3 Saw	4 Saw
WH	18.6			213	123	78	12
RC	16.9			11		9	1
SF	16.7			9		9	
ALL	18.3			233	123	97	13

### Unit Cruise Design: GREENSTONE 1A

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	6.8	7.0	5	5	0

### Unit Cruise Summary: GREENSTONE 1A

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	20	20	4.0	0
RC	4	4	0.8	0
SF	1	1	0.2	0
ALL	25	25	5.0	0

### Unit Cruise Statistics: GREENSTONE 1A

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	217.8	39.5	17.7	143.6	18.5	4.1	31,273	43.6	18.2
RC	32.0	136.9	61.2	48.5	48.4	24.2	1,552	145.2	65.8
SF	10.9	223.6	100.0	127.5	0.0	0.0	1,389	223.6	100.0
ALL	260.6	37.9	16.9	131.3	33.1	6.6	34,214	50.3	18.2

### Unit Summary: GREENSTONE 1A

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
RC	LIVE	CUT	4	ALL	16.9	52	64	2,257	1,552	31.2	20.5	32.0	7.8	10.6
SF	LIVE	CUT	1	ALL	16.7	69	87	1,389	1,389	0.0	7.2	10.9	2.7	9.4

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
WH	LIVE	CUT	20	ALL	18.6	71	89	31,439	31,273	0.5	115.4	217.8	50.5	212.7
ALL	LIVE	CUT	25	ALL	18.3	69	86	35,085	34,214	2.5	143.1	260.6	60.9	232.7
ALL	ALL	ALL	25	ALL	18.3	69	86	35,085	34,214	2.5	143.1	260.6	60.9	232.7

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## Cruise Unit Report GREENSTONE 1B

### Unit Sale Notice Volume (MBF): GREENSTONE 1B

Sp	DBH	Rings/In	Age	MBF Volume by Grade				
				All	2 Saw	3 Saw	4 Saw	Utility
WH	16.3			182	86	78	14	4
SF	16.6			39	12	23	4	
RC	14.0			5		4	2	
ALL	16.2			227	98	105	19	4

### Unit Cruise Design: GREENSTONE 1B

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	4.4	5.0	5	5	0

### Unit Cruise Summary: GREENSTONE 1B

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	25	25	5.0	0
SF	6	6	1.2	0
RC	2	2	0.4	0
ALL	33	33	6.6	0

### Unit Cruise Statistics: GREENSTONE 1B

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	272.2	46.9	21.0	151.9	21.2	4.2	41,350	51.5	21.4
SF	65.3	91.3	40.8	136.3	21.5	8.8	8,907	93.8	41.8
RC	16.0	136.9	61.2	76.6	68.4	48.4	1,225	153.1	78.1
ALL	353.5	30.1	13.5	145.6	25.2	4.4	51,482	39.2	14.2

### Unit Summary: GREENSTONE 1B

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
RC	LIVE	CUT	2	ALL	14.0	51	63	1,225	1,225	0.0	15.0	16.0	4.3	5.4
SF	LIVE	CUT	6	ALL	16.6	71	89	9,197	8,907	3.1	43.5	65.3	16.0	39.2

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
WH	LIVE	CUT	25	ALL	16.3	72	90	42,005	41,350	1.6	187.8	272.2	67.4	181.9
ALL	LIVE	CUT	33	ALL	16.2	71	88	52,426	51,482	1.8	246.3	353.5	87.7	226.5
ALL	ALL	ALL	33	ALL	16.2	71	88	52,426	51,482	1.8	246.3	353.5	87.7	226.5

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## Cruise Unit Report GREENSTONE 2A

### Unit Sale Notice Volume (MBF): GREENSTONE 2A

Sp	DBH	Rings/In	Age	MBF Volume by Grade			
				All	2 Saw	3 Saw	4 Saw
WH	13.6			151	13	113	26
RC	18.0			75		73	3
SF	21.0			14	12		2
ALL	15.3			241	25	185	31

### Unit Cruise Design: GREENSTONE 2A

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	9.3	9.8	4	4	0

### Unit Cruise Summary: GREENSTONE 2A

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	11	11	2.8	0
RC	11	11	2.8	0
SF	1	1	0.3	0
ALL	23	23	5.8	0

### Unit Cruise Statistics: GREENSTONE 2A

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	149.7	80.6	40.3	108.7	10.5	3.2	16,268	81.3	40.4
RC	110.0	80.6	40.3	73.6	38.8	11.7	8,095	89.5	42.0
SF	13.6	200.0	100.0	113.1	0.0	0.0	1,539	200.0	100.0
ALL	273.3	6.6	3.3	94.8	29.1	6.1	25,902	29.8	6.9

### Unit Summary: GREENSTONE 2A

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
RC	LIVE	CUT	11	ALL	18.0	52	64	8,218	8,095	1.5	62.2	110.0	25.9	75.3
SF	LIVE	CUT	1	ALL	21.0	62	78	1,539	1,539	0.0	5.7	13.6	3.0	14.3

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
WH	LIVE	CUT	11	ALL	13.6	60	74	16,268	16,268	0.0	148.4	149.7	40.6	151.3
ALL	LIVE	CUT	23	ALL	15.2	57	71	26,025	25,902	0.5	216.3	273.3	69.5	240.9
ALL	ALL	ALL	23	ALL	15.2	57	71	26,025	25,902	0.5	216.3	273.3	69.5	240.9

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## Cruise Unit Report GREENSTONE 2B

### Unit Sale Notice Volume (MBF): GREENSTONE 2B

Sp	DBH	Rings/In	Age	MBF Volume by Grade			
				All	2 Saw	3 Saw	4 Saw
WH	16.7			119	57	55	7
SF	15.8			85	22	55	7
DF	20.8			14	8	6	1
RC	30.0			6		6	
ALL	16.7			225	88	122	15

### Unit Cruise Design: GREENSTONE 2B

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	6.8	7.4	4	4	0

### Unit Cruise Summary: GREENSTONE 2B

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	12	12	3.0	0
SF	7	7	1.8	0
DF	1	1	0.3	0
RC	1	1	0.3	0
ALL	21	21	5.3	0

### Unit Cruise Statistics: GREENSTONE 2B

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	163.3	60.9	30.4	107.4	34.8	10.0	17,537	70.1	32.0
SF	95.3	97.6	48.8	130.5	21.9	8.3	12,429	100.0	49.5
DF	13.6	200.0	100.0	155.9	0.0	0.0	2,122	200.0	100.0
RC	10.0	200.0	100.0	92.9	0.0	0.0	929	200.0	100.0
ALL	282.2	31.3	15.6	117.0	30.0	6.6	33,018	43.3	16.9

**Unit Summary: GREENSTONE 2B**

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
DF	LIVE	CUT	1	ALL	20.8	80	101	2,226	2,122	4.7	5.8	13.6	3.0	14.4
RC	LIVE	CUT	1	ALL	30.0	65	82	929	929	0.0	2.0	10.0	1.8	6.3
SF	LIVE	CUT	7	ALL	15.8	69	87	12,675	12,429	1.9	70.0	95.3	24.0	84.5
WH	LIVE	CUT	12	ALL	16.7	66	81	20,026	17,537	12.4	107.4	163.3	40.0	119.3
ALL	LIVE	CUT	21	ALL	16.7	67	84	35,856	33,018	7.9	185.2	282.2	68.7	224.5
ALL	ALL	ALL	21	ALL	16.7	67	84	35,856	33,018	7.9	185.2	282.2	68.7	224.5

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## Cruise Unit Report GREENSTONE 2C

### Unit Sale Notice Volume (MBF): GREENSTONE 2C

Sp	DBH	Rings/In	Age	MBF Volume by Grade				
				All	2 Saw	3 Saw	4 Saw	Utility
WH	14.8			210	67	109	23	11
SF	14.5			165	45	101	19	
RC	13.3			2			2	
ALL	14.6			376	112	210	44	11

### Unit Cruise Design: GREENSTONE 2C

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	10.6	10.8	5	5	0

### Unit Cruise Summary: GREENSTONE 2C

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	15	15	3.0	0
SF	12	12	2.4	0
RC	1	1	0.2	0
ALL	28	28	5.6	0

### Unit Cruise Statistics: GREENSTONE 2C

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	163.3	40.8	18.3	121.2	19.2	4.9	19,800	45.1	18.9
SF	130.7	120.0	53.7	118.8	30.8	8.9	15,527	123.9	54.4
RC	8.0	223.6	100.0	20.7	0.0	0.0	166	223.6	100.0
ALL	302.0	33.2	14.9	117.5	29.2	5.5	35,493	44.2	15.8

### Unit Summary: GREENSTONE 2C

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
RC	LIVE	CUT	1	ALL	13.3	50	62	547	166	69.7	8.3	8.0	2.2	1.8
SF	LIVE	CUT	12	ALL	14.5	59	73	15,527	15,527	0.0	113.9	130.7	34.3	164.6

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
WH	LIVE	CUT	15	ALL	14.8	59	73	20,072	19,800	1.4	136.7	163.3	42.5	209.9
ALL	LIVE	CUT	28	ALL	14.6	59	72	36,147	35,493	1.8	258.9	302.0	79.0	376.2
ALL	ALL	ALL	28	ALL	14.6	59	72	36,147	35,493	1.8	258.9	302.0	79.0	376.2

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## Cruise Unit Report GREENSTONE 3

### Unit Sale Notice Volume (MBF): GREENSTONE 3

Sp	DBH	Rings/In	Age	MBF Volume by Grade			
				All	2 Saw	3 Saw	4 Saw
WH	12.6			524	107	360	58
SF	15.2			62	15	39	9
RC	21.9			13		12	1
ALL	12.9			599	122	410	67

### Unit Cruise Design: GREENSTONE 3

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 0 ft	12.7	14.0	8	8	0

### Unit Cruise Summary: GREENSTONE 3

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	50	50	6.3	0
SF	6	6	0.8	0
RC	2	2	0.3	0
ALL	58	58	7.3	0

### Unit Cruise Statistics: GREENSTONE 3

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	340.3	30.5	10.8	121.3	28.5	4.0	41,285	41.8	11.5
SF	40.8	118.2	41.8	120.3	16.3	6.6	4,913	119.3	42.3
RC	10.0	282.8	100.0	98.8	6.2	4.4	988	282.9	100.1
ALL	391.1	21.1	7.4	120.7	27.3	3.6	47,186	34.4	8.3

### Unit Summary: GREENSTONE 3

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
RC	LIVE	CUT	2	ALL	21.9	68	80	1,027	988	3.8	3.8	10.0	2.1	12.5
SF	LIVE	CUT	6	ALL	15.2	62	88	4,913	4,913	0.0	32.4	40.8	10.5	62.4

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
WH	LIVE	CUT	50	ALL	12.6	50	75	42,118	41,285	2.0	393.0	340.3	95.9	524.3
ALL	LIVE	CUT	58	ALL	12.9	51	76	48,057	47,186	1.8	429.2	391.1	108.5	599.3
ALL	ALL	ALL	58	ALL	12.9	51	76	48,057	47,186	1.8	429.2	391.1	108.5	599.3

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## Cruise Unit Report GREENSTONE 4

### Unit Sale Notice Volume (MBF): GREENSTONE 4

Sp	DBH	Rings/In	Age	MBF Volume by Grade				
				All	2 Saw	3 Saw	4 Saw	Utility
WH	13.5			725	234	407	85	
DF	17.0			24		24		
SF	16.0			11		8	2	
RA	20.5			10	7			3
RC	20.9			9		8	1	
ALL	13.8			778	241	447	88	3

### Unit Cruise Design: GREENSTONE 4

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 0 ft	16.4	17.2	11	11	0

### Unit Cruise Summary: GREENSTONE 4

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	41	69	6.3	0
DF	1	2	0.2	0
SF	1	1	0.1	0
RA	1	1	0.1	0
RC	2	2	0.2	0
ALL	46	75	6.8	0

### Unit Cruise Statistics: GREENSTONE 4

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	341.5	50.0	15.1	129.5	28.9	4.5	44,229	57.7	15.7
DF	9.9	222.5	67.1	145.9	0.0	0.0	1,444	222.5	67.1
SF	4.9	331.7	100.0	131.1	0.0	0.0	649	331.7	100.0
RA	3.6	331.7	100.0	162.3	0.0	0.0	590	331.7	100.0
RC	7.3	222.5	67.1	76.2	42.8	30.2	554	226.6	73.6
ALL	367.2	42.3	12.7	129.3	29.2	4.3	47,466	51.4	13.5

**Unit Summary: GREENSTONE 4**

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
DF	LIVE	CUT	1	ALL	12.2	76	100	1,444	1,444	0.0	12.2	9.9	2.8	23.7
RA	LIVE	CUT	1	ALL	20.5	78	97	590	590	0.0	1.6	3.6	0.8	9.7
RC	LIVE	CUT	2	ALL	20.9	62	75	554	554	0.0	3.1	7.3	1.6	9.1
SF	LIVE	CUT	1	ALL	16.0	67	84	649	649	0.0	3.5	4.9	1.2	10.6
WH	LIVE	CUT	41	ALL	13.7	53	77	44,239	44,229	0.0	333.6	341.5	92.3	725.4
ALL	LIVE	CUT	46	ALL	13.8	54	78	47,476	47,466	0.0	354.0	367.2	98.7	778.4
ALL	ALL	ALL	46	ALL	13.8	54	78	47,476	47,466	0.0	354.0	367.2	98.7	778.4

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## Cruise Unit Report GREENSTONE 5

### Unit Sale Notice Volume (MBF): GREENSTONE 5

Sp	DBH	Rings/In	Age	MBF Volume by Grade			
				All	2 Saw	3 Saw	4 Saw
WH	15.9			263	147	106	10
DF	24.0			8	7		1
RC	12.0			3			3
ALL	15.9			274	154	106	14

### Unit Cruise Design: GREENSTONE 5

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 0 ft	4.6	5.0	4	4	0

### Unit Cruise Summary: GREENSTONE 5

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	14	29	7.3	0
DF	1	1	0.3	0
RC	1	1	0.3	0
ALL	16	31	7.8	0

### Unit Cruise Statistics: GREENSTONE 5

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	394.7	6.9	3.4	144.9	26.4	7.1	57,176	27.3	7.9
DF	13.6	200.0	100.0	131.5	0.0	0.0	1,789	200.0	100.0
RC	10.0	200.0	100.0	54.7	0.0	0.0	547	200.0	100.0
ALL	418.3	6.2	3.1	142.3	29.6	7.4	59,513	30.3	8.0

### Unit Summary: GREENSTONE 5

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
DF	LIVE	CUT	1	ALL	24.0	81	92	1,789	1,789	0.0	4.3	13.6	2.8	8.2
RC	LIVE	CUT	1	ALL	12.0	51	63	547	547	0.0	12.7	10.0	2.9	2.5

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
WH	LIVE	CUT	14	ALL	17.2	60	82	57,205	57,176	0.1	244.6	394.7	95.2	263.0
ALL	LIVE	CUT	16	ALL	17.1	60	81	59,542	59,513	0.0	261.6	418.3	100.8	273.8
ALL	ALL	ALL	16	ALL	17.1	60	81	59,542	59,513	0.0	261.6	418.3	100.8	273.8

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## Cruise Unit Report GREENSTONE 6

### Unit Sale Notice Volume (MBF): GREENSTONE 6

Sp	DBH	Rings/In	Age	MBF Volume by Grade			
				All	2 Saw	3 Saw	4 Saw
WH	16.3			36	18	15	3
DF	20.8			33	25	7	
ALL	18.1			68	43	22	3

### Unit Cruise Design: GREENSTONE 6

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 0 ft	2.3	2.4	1	1	0

### Unit Cruise Summary: GREENSTONE 6

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	2	2	2.0	0
DF	2	2	2.0	0
ALL	4	4	4.0	0

### Unit Cruise Statistics: GREENSTONE 6

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	108.9	0.0	0.0	142.6	21.6	15.2	15,526	21.6	15.2
DF	108.9	0.0	0.0	130.5	12.5	8.8	14,208	12.5	8.8
ALL	217.8	0.0	0.0	136.5	15.6	7.8	29,734	15.6	7.8

### Unit Summary: GREENSTONE 6

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
DF	LIVE	CUT	2	ALL	20.8	76	97	14,208	14,208	0.0	46.1	108.9	23.9	32.7
WH	LIVE	CUT	2	ALL	16.3	63	86	15,526	15,526	0.0	75.1	108.9	27.0	35.7
ALL	LIVE	CUT	4	ALL	18.1	68	90	29,734	29,734	0.0	121.2	217.8	50.8	68.4
ALL	ALL	ALL	4	ALL	18.1	68	90	29,734	29,734	0.0	121.2	217.8	50.8	68.4

## Cruise Unit Report GREENSTONE 7A

### Unit Sale Notice Volume (MBF): GREENSTONE 7A

Sp	DBH	Rings/In	Age	MBF Volume by Grade				
				All	2 Saw	3 Saw	4 Saw	Utility
WH	15.4			69	40	19	8	2
DF	22.1			34	23	11		
RC	18.5			3		3		
ALL	17.0			106	63	33	8	2

### Unit Cruise Design: GREENSTONE 7A

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	2.7	2.9	2	2	0

### Unit Cruise Summary: GREENSTONE 7A

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	8	8	4.0	0
DF	4	4	2.0	0
RC	1	1	0.5	0
ALL	13	13	6.5	0

### Unit Cruise Statistics: GREENSTONE 7A

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	217.8	0.0	0.0	117.9	25.2	8.9	25,679	25.2	8.9
DF	108.9	70.7	50.0	114.1	27.0	13.5	12,422	75.7	51.8
RC	20.0	141.4	100.0	62.1	0.0	0.0	1,243	141.4	100.0
ALL	346.6	14.1	9.9	113.5	27.6	7.7	39,344	31.0	12.5

### Unit Summary: GREENSTONE 7A

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
DF	LIVE	CUT	4	ALL	22.1	79	100	13,706	12,422	9.4	40.9	108.9	23.2	33.5
RC	LIVE	CUT	1	ALL	18.5	55	68	1,243	1,243	0.0	10.7	20.0	4.6	3.4

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
WH	LIVE	CUT	8	ALL	15.4	70	87	26,139	25,679	1.8	168.4	217.8	55.5	69.3
ALL	LIVE	CUT	13	ALL	17.0	71	88	41,087	39,344	4.2	220.0	346.6	83.3	106.2
ALL	ALL	ALL	13	ALL	17.0	71	88	41,087	39,344	4.2	220.0	346.6	83.3	106.2

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## Cruise Unit Report GREENSTONE 7B

### Unit Sale Notice Volume (MBF): GREENSTONE 7B

Sp	DBH	Rings/In	Age	MBF Volume by Grade				Utility
				All	2 Saw	3 Saw	4 Saw	
WH	17.1			603	327	224	52	
DF	21.8			137	91	39	7	
RC	17.2			88		71	17	
RA	17.1			12	5		3	4
SF	15.7			11		9	2	
ALL	17.6			851	422	344	80	4

### Unit Cruise Design: GREENSTONE 7B

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2C: VR, 2 BAF (54.44, 40 for some species) Measure/Count Plots, Sighting Ht = 4.5 ft	32.1	33.9	21	12	0

### Unit Cruise Summary: GREENSTONE 7B

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	32	60	2.9	0
DF	9	12	0.6	0
RC	22	23	1.1	0
RA	3	3	0.1	0
SF	1	1	0.0	0
ALL	67	99	4.7	0

### Unit Cruise Statistics: GREENSTONE 7B

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	155.5	72.0	15.7	120.8	17.1	3.0	18,783	74.0	16.0
DF	31.1	152.3	33.2	137.0	22.3	7.4	4,262	153.9	34.1
RC	43.8	128.8	28.1	62.6	41.1	8.8	2,744	135.2	29.4
RA	5.7	458.3	100.0	63.9	52.1	30.1	365	461.2	104.4
SF	2.6	458.3	100.0	133.2	0.0	0.0	345	458.3	100.0
ALL	238.8	45.2	9.9	111.0	34.8	4.3	26,499	57.1	10.7



**Unit Summary: GREENSTONE 7B**

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
DF	LIVE	CUT	9	ALL	21.8	77	97	4,410	4,262	3.3	12.0	31.1	6.7	136.8
RA	LIVE	CUT	3	ALL	17.1	49	59	497	365	26.6	3.6	5.7	1.4	11.7
RC	LIVE	CUT	22	ALL	17.2	50	61	2,794	2,744	1.8	27.2	43.8	10.6	88.1
SF	LIVE	CUT	1	ALL	15.7	66	83	345	345	0.0	1.9	2.6	0.7	11.1
WH	LIVE	CUT	32	ALL	17.1	65	80	18,866	18,783	0.4	97.5	155.5	37.6	602.9
ALL	LIVE	CUT	67	ALL	17.5	63	77	26,912	26,499	1.5	142.2	238.8	56.9	850.6
ALL	ALL	ALL	67	ALL	17.5	63	77	26,912	26,499	1.5	142.2	238.8	56.9	850.6

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## Cruise Unit Report GREENSTONE 7C

### Unit Sale Notice Volume (MBF): GREENSTONE 7C

Sp	DBH	Rings/In	Age	MBF Volume by Grade			
				All	2 Saw	3 Saw	4 Saw
WH	16.6			35	18	15	2
SF	13.9			9		7	2
ALL	15.9			44	18	22	4

### Unit Cruise Design: GREENSTONE 7C

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B1: VR, 1 BAF (54.44) Measure All, Sighting Ht = 4.5 ft	0.9	0.9	2	2	0

### Unit Cruise Summary: GREENSTONE 7C

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	11	11	5.5	0
SF	3	3	1.5	0
ALL	14	14	7.0	0

### Unit Cruise Statistics: GREENSTONE 7C

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	299.4	12.9	9.1	129.2	6.8	2.1	38,684	14.6	9.3
SF	81.7	47.1	33.3	121.7	15.0	8.7	9,939	49.5	34.4
ALL	381.1	0.0	0.0	127.6	8.6	2.3	48,623	8.6	2.3

### Unit Summary: GREENSTONE 7C

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
SF	LIVE	CUT	3	ALL	13.9	62	78	9,939	9,939	0.0	77.5	81.7	21.9	8.9
WH	LIVE	CUT	11	ALL	16.6	67	84	38,684	38,684	0.0	199.2	299.4	73.5	34.8
ALL	LIVE	CUT	14	ALL	15.9	66	82	48,623	48,623	0.0	276.7	381.1	95.4	43.8
ALL	ALL	ALL	14	ALL	15.9	66	82	48,623	48,623	0.0	276.7	381.1	95.4	43.8

### Cruise Unit Report GREENSTONE 7D

**Unit Sale Notice Volume (MBF): GREENSTONE 7D**

Sp	DBH	Rings/In	Age	MBF Volume by Grade			
				All	2 Saw	3 Saw	4 Saw
WH	15.9			438	172	225	41
SF	22.0			43	35	7	1
DF	22.7			29	24	5	
RC	16.3			11		10	1
ALL	16.8			521	231	248	43

**Unit Cruise Design: GREENSTONE 7D**

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2C: VR, 2 BAF (62.5, 40 for some species) Measure/Count Plots, Sighting Ht = 4.5 ft	14.7	15.0	9	5	0

**Unit Cruise Summary: GREENSTONE 7D**

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	20	35	3.9	0
SF	3	3	0.3	0
DF	2	2	0.2	0
RC	2	3	0.3	0
ALL	27	43	4.8	0

**Unit Cruise Statistics: GREENSTONE 7D**

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	243.1	30.0	10.0	122.6	24.9	5.6	29,806	39.0	11.4
SF	20.8	212.1	70.7	140.2	22.6	13.0	2,921	213.3	71.9
DF	13.9	300.0	100.0	141.1	16.2	11.5	1,959	300.4	100.7
RC	13.3	212.1	70.7	58.4	27.0	19.1	779	213.8	73.2
ALL	291.1	22.6	7.5	121.8	28.0	5.4	35,466	36.0	9.3

**Unit Summary: GREENSTONE 7D**

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
DF	LIVE	CUT	2	ALL	22.7	79	100	1,959	1,959	0.0	4.9	13.9	2.9	28.8
RC	LIVE	CUT	2	ALL	16.3	53	66	779	779	0.0	9.2	13.3	3.3	11.5
SF	LIVE	CUT	3	ALL	22.0	77	98	2,921	2,921	0.0	7.9	20.8	4.4	42.9
WH	LIVE	CUT	20	ALL	15.9	63	78	29,988	29,806	0.6	176.3	243.1	61.0	438.2
ALL	LIVE	CUT	27	ALL	16.4	64	79	35,648	35,466	0.5	198.3	291.1	71.6	521.3
ALL	ALL	ALL	27	ALL	16.4	64	79	35,648	35,466	0.5	198.3	291.1	71.6	521.3

## Cruise Unit Report GREENSTONE 8

### Unit Sale Notice Volume (MBF): GREENSTONE 8

Sp	DBH	Rings/In	Age	MBF Volume by Grade				
				All	2 Saw	3 Saw	4 Saw	Utility
WH	15.2			723	241	361	92	28
SF	13.8			154	58	67	30	
RC	18.4			38		34	5	
ALL	15.1			916	299	462	127	28

### Unit Cruise Design: GREENSTONE 8

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2C: VR, 2 BAF (54.44, 40 for some species) Measure/Count Plots, Sighting Ht = 4.5 ft	26.3	27.8	17	9	0

### Unit Cruise Summary: GREENSTONE 8

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	31	73	4.3	0
SF	9	17	1.0	0
RC	8	8	0.5	0
ALL	48	98	5.8	0

### Unit Cruise Statistics: GREENSTONE 8

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	233.8	46.4	11.3	117.6	18.3	3.3	27,484	49.9	11.7
SF	54.4	117.3	28.4	107.8	28.6	9.5	5,868	120.7	30.0
RC	18.8	250.5	60.8	77.5	32.8	11.6	1,458	252.6	61.9
ALL	307.0	35.0	8.5	113.4	24.5	3.5	34,811	42.7	9.2

### Unit Summary: GREENSTONE 8

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
RC	LIVE	CUT	8	ALL	18.4	56	70	1,477	1,458	1.3	10.2	18.8	4.4	38.4
SF	LIVE	CUT	9	ALL	13.8	55	69	5,998	5,868	2.2	52.4	54.4	14.7	154.3

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
WH	LIVE	CUT	31	ALL	15.2	62	77	28,321	27,484	3.0	185.5	233.8	60.0	722.8
ALL	LIVE	CUT	48	ALL	15.1	60	75	35,797	34,811	2.8	248.1	307.0	79.0	915.5
ALL	ALL	ALL	48	ALL	15.1	60	75	35,797	34,811	2.8	248.1	307.0	79.0	915.5

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## Cruise Unit Report GREENSTONE ROW

### Unit Sale Notice Volume (MBF): GREENSTONE ROW

Sp	DBH	Rings/In	Age	MBF Volume by Grade				
				All	2 Saw	3 Saw	4 Saw	Utility
WH	13.8			97	15	67	15	
RC	17.9			22		20	2	
DF	17.9			17	3	13	1	
SF	15.2			13		11	1	0
RA	14.8			13		7	6	
ALL	14.9			161	18	118	25	0

### Unit Cruise Design: GREENSTONE ROW

Design	Cruise Acres	FMA Acres	N Plots	N Cruise Plots	N Void Plots
B2: VR, 2 BAF (54.44, 40 for some species) Measure All, Sighting Ht = 4.5 ft	7.2	7.0	14	14	0

### Unit Cruise Summary: GREENSTONE ROW

Sp	Cruised Trees	All Trees	Trees/Plot	Ring-Count Trees
WH	31	31	2.2	0
RC	15	15	1.1	0
DF	5	5	0.4	0
SF	4	4	0.3	0
RA	8	8	0.6	0
ALL	63	63	4.5	0

### Unit Cruise Statistics: GREENSTONE ROW

Sp	BA (sq ft/acre)	BA CV (%)	BA SE (%)	V-BAR (bf/sq ft)	V-BAR CV (%)	V-BAR SE (%)	Net Vol (bf/acre)	Vol CV (%)	Vol SE (%)
WH	120.5	79.6	21.3	111.3	24.6	4.4	13,414	83.3	21.7
RC	42.9	148.5	39.7	70.9	39.4	10.2	3,040	153.7	41.0
DF	19.4	177.3	47.4	120.9	14.8	6.6	2,351	177.9	47.9
SF	15.6	213.9	57.2	116.7	23.8	11.9	1,815	215.3	58.4
RA	22.9	164.1	43.9	76.2	34.7	12.3	1,741	167.7	45.5
ALL	221.3	36.2	9.7	101.1	32.4	4.1	22,361	48.6	10.5

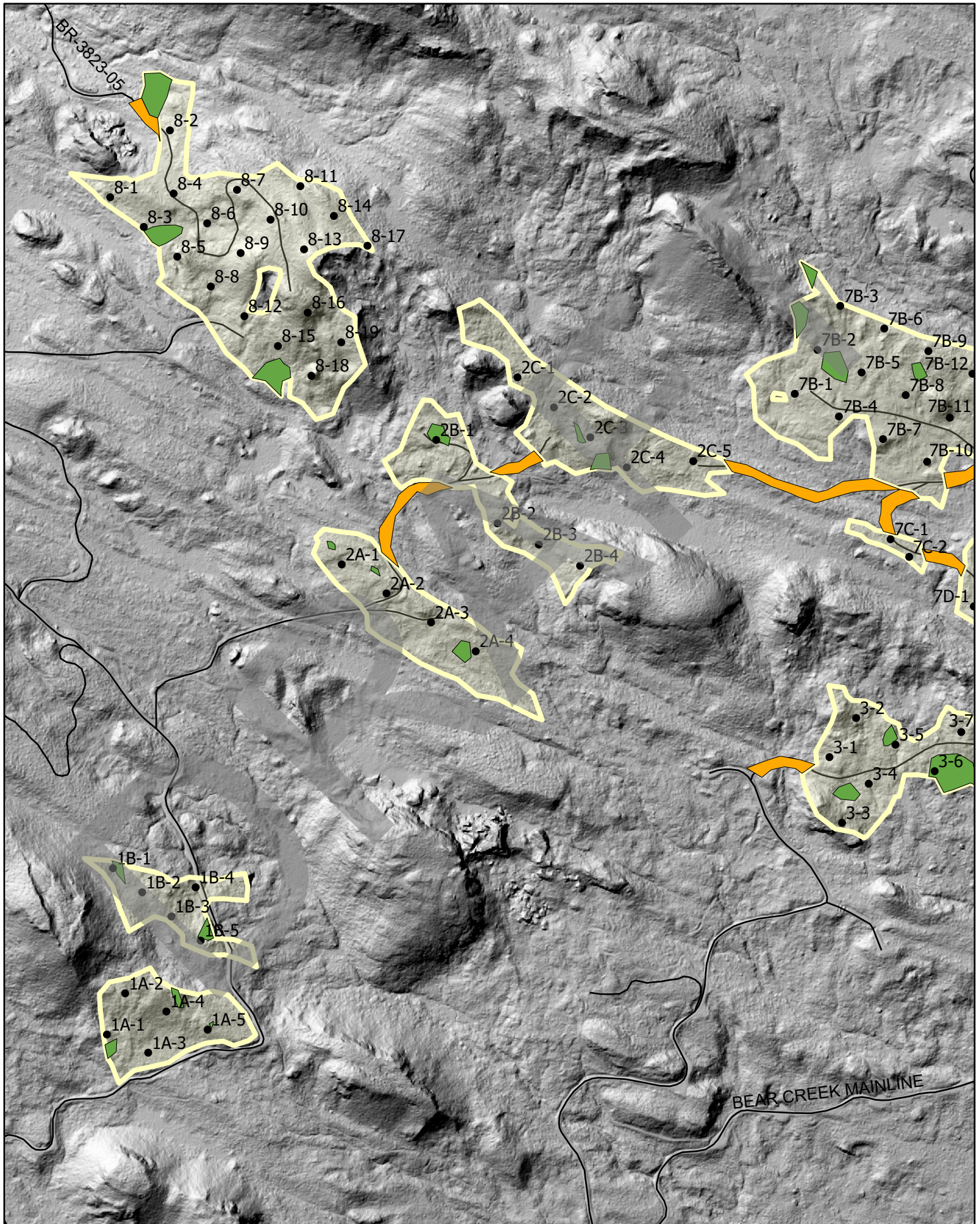
**Unit Summary: GREENSTONE ROW**

Sp	Status	Rx	N	D	DBH	BL	THT	BF Gross	BF Net	Defect %	TPA	BA	RD	MBF Net
DF	LIVE	CUT	5	ALL	17.9	72	91	2,351	2,351	0.0	11.1	19.4	4.6	16.9
RA	LIVE	CUT	8	ALL	14.8	54	65	1,859	1,741	6.4	19.1	22.9	5.9	12.5
RC	LIVE	CUT	15	ALL	17.9	57	72	3,057	3,040	0.6	24.5	42.9	10.1	21.9
SF	LIVE	CUT	4	ALL	15.2	68	83	2,040	1,815	11.0	12.3	15.6	4.0	13.1
WH	LIVE	CUT	31	ALL	13.8	61	77	13,536	13,414	0.9	116.1	120.5	32.4	96.6
ALL	LIVE	CUT	63	ALL	14.9	61	76	22,844	22,361	2.1	183.1	221.3	57.1	161.0
ALL	ALL	ALL	63	ALL	14.9	61	76	22,844	22,361	2.1	183.1	221.3	57.1	161.0

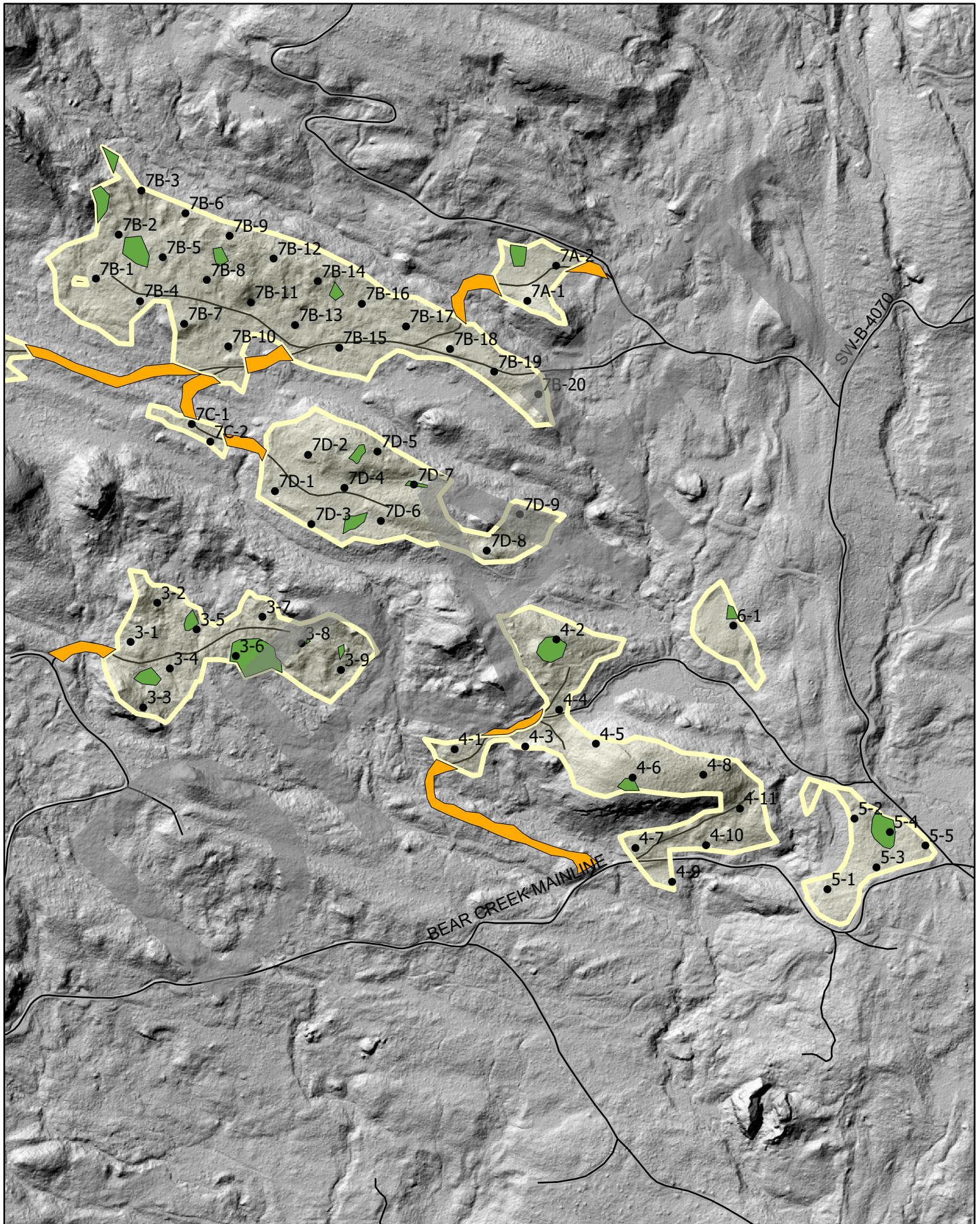
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# Greenstone Sample Point Map



# Greenstone Sample Point Map





# ROAD PLAN AND SPECIFICATIONS

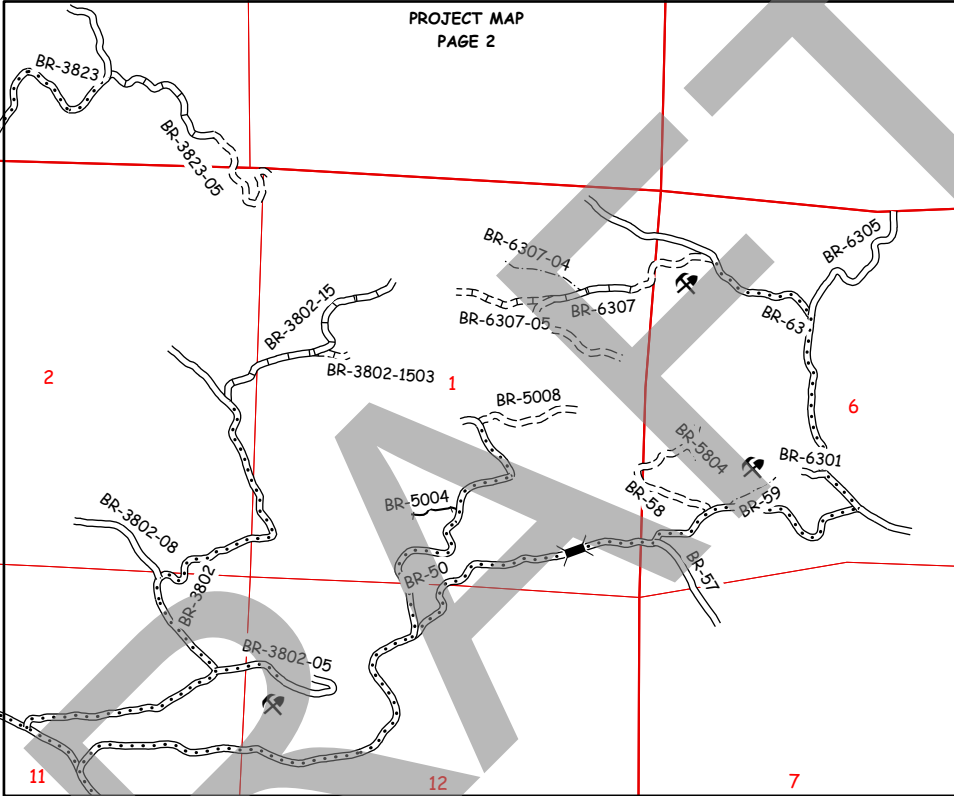
## #30-106183 GREENSTONE TIMBER SALE

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LEGEND	
PRE-HAUL MAINTENANCE	-----
REQUIRED CONSTRUCTION	-----
OPTIONAL CONSTRUCTION	-----
REQUIRED RECONSTRUCTION	-----
OPTIONAL RECONSTRUCTION	-----



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T33R06E

T33R05E

SCALE



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DESIGNED BY	REVIEWED BY	APPROVED BY	PLAN DATE	SHEET
J. WESTRA	ZYLSTRA 10/1/2024	ZYLSTRA 10/1/2024	11/20/2023	1 OF 45

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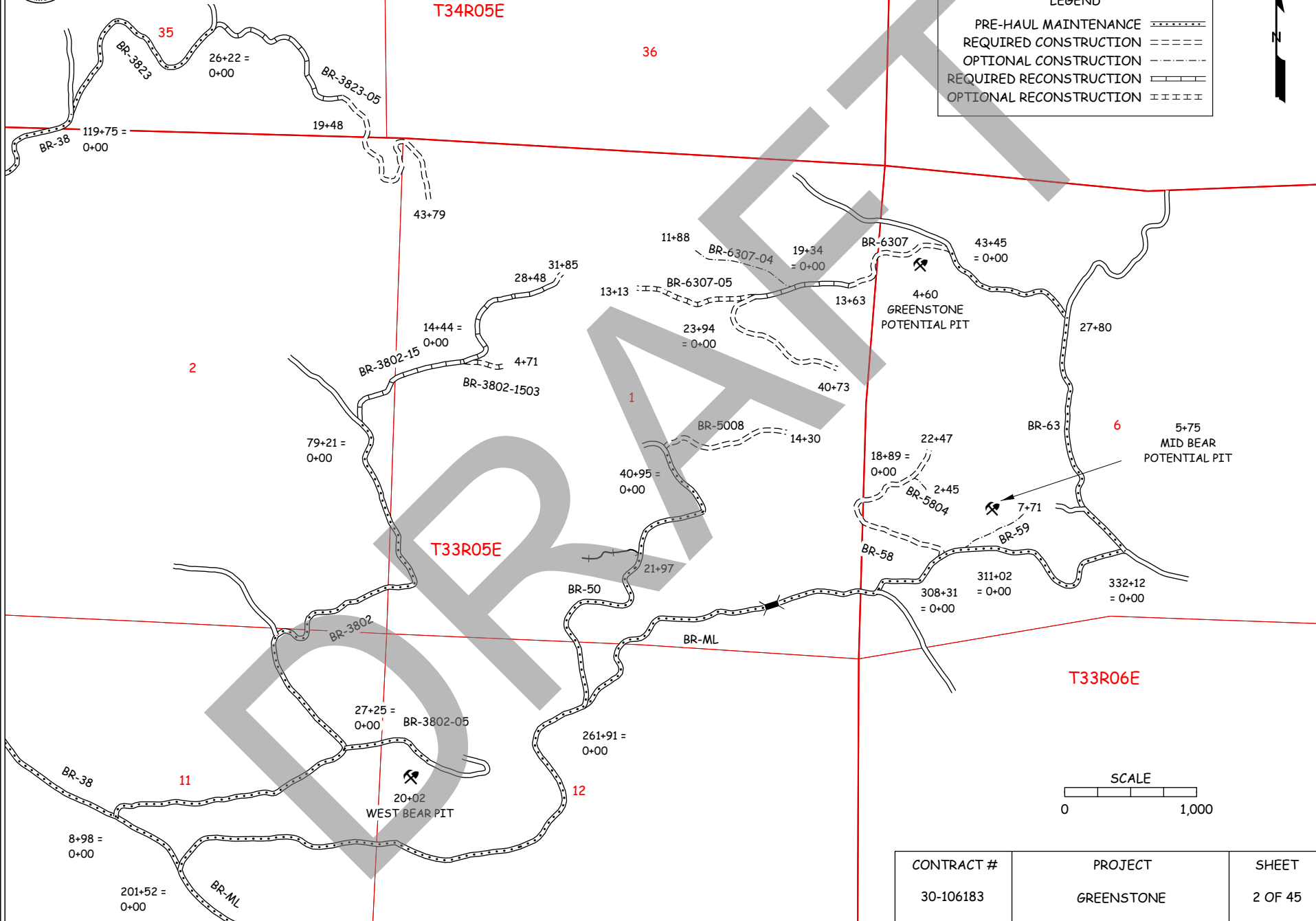
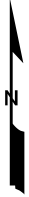


WASHINGTON STATE  
DEPT. OF NATURAL RESOURCES  
NORTHWEST REGION

T34R05E

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LEGEND	
PRE-HAUL MAINTENANCE	-----
REQUIRED CONSTRUCTION	-----
OPTIONAL CONSTRUCTION	- - - - -
REQUIRED RECONSTRUCTION	=====
OPTIONAL RECONSTRUCTION	=====



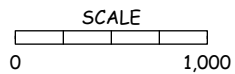
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CONTRACT #	PROJECT	SHEET
30-106183	GREENSTONE	2 OF 45

STATE OF WASHINGTON  
DEPARTMENT OF NATURAL RESOURCES

GREENSTONE TIMBER SALE ROAD PLAN  
SKAGIT COUNTY  
CLEAR LAKE DISTRICT  
NORTHWEST REGION

AGREEMENT NO.: 30-106183

STAFF ENGINEER: J. WESTRA

DATE: NOVEMBER 20, 2023

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>
BR-ML	0+00 to 332+12	PREHAUL MAINTENANCE
BR-38	0+00 to 119+75	PREHAUL MAINTENANCE
BR-3802	0+00 to 79+21	PREHAUL MAINTENANCE
BR-3802-05	0+00 to 20+02	PREHAUL MAINTENANCE
BR-3802-15	0+00 to 28+48	RECONSTRUCTION
BR-3802-15	28+48 to 31+85	CONSTRUCTION
BR-3823	0+00 to 26+22	PREHAUL MAINTENANCE
BR-3823-05	0+00 to 19+48	RECONSTRUCTION
BR-3823-05	19+48 to 43+79	CONSTRUCTION
BR-50	0+00 to 40+95	PREHAUL MAINTENANCE
BR-5008	0+00 to 14+30	CONSTRUCTION
BR-58	0+00 to 22+47	CONSTRUCTION
BR-63	0+00 to 43+40	PREHAUL MAINTENANCE
BR-6307	0+00 to 13+63 23+94 to 40+73	CONSTRUCTION
BR-6307	13+63 to 23+94	RECONSTRUCTION

**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.

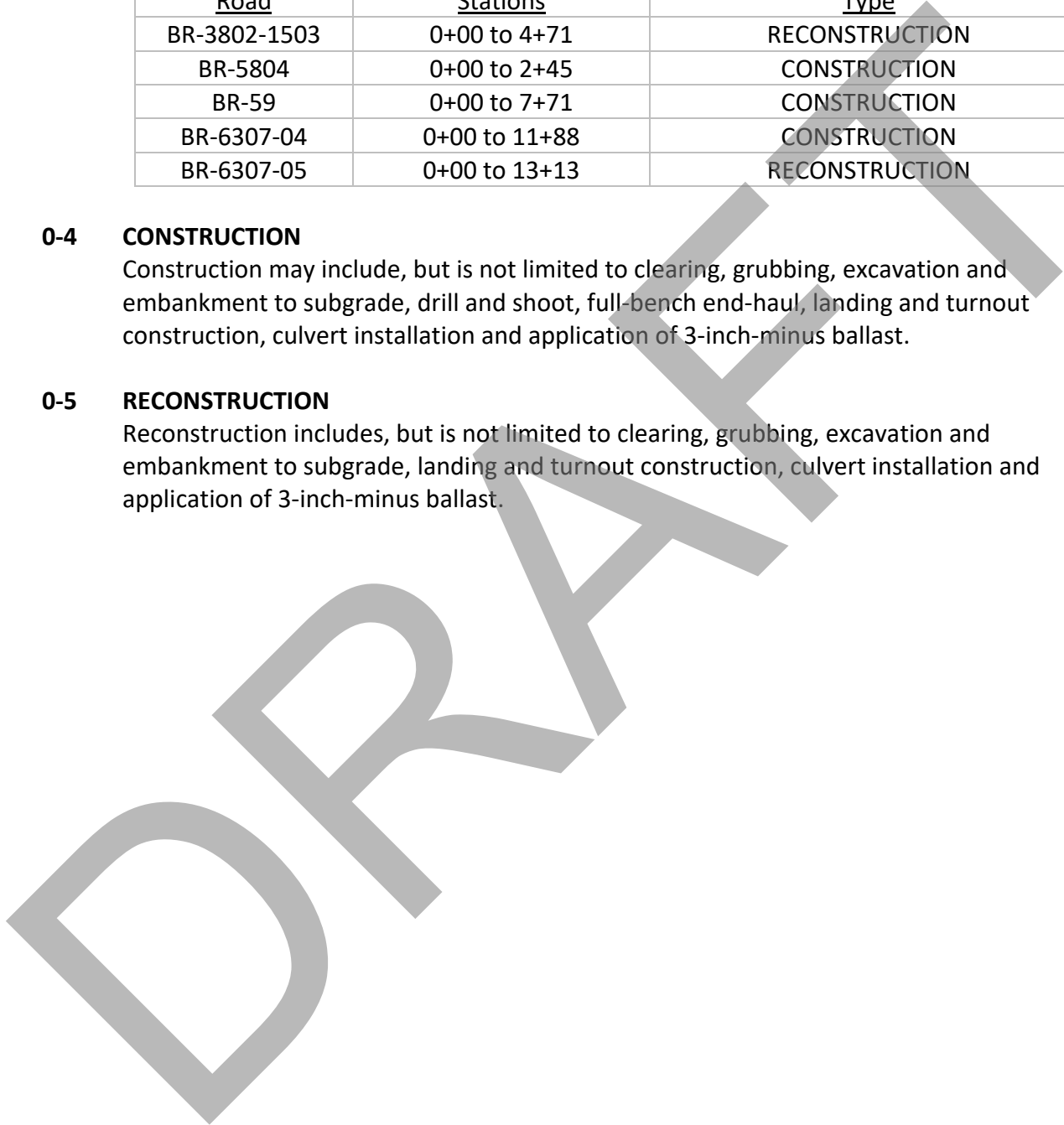
<u>Road</u>	<u>Stations</u>	<u>Type</u>
BR-3802-1503	0+00 to 4+71	RECONSTRUCTION
BR-5804	0+00 to 2+45	CONSTRUCTION
BR-59	0+00 to 7+71	CONSTRUCTION
BR-6307-04	0+00 to 11+88	CONSTRUCTION
BR-6307-05	0+00 to 13+13	RECONSTRUCTION

**0-4 CONSTRUCTION**

Construction may include, but is not limited to clearing, grubbing, excavation and embankment to subgrade, drill and shoot, full-bench end-haul, landing and turnout construction, culvert installation and application of 3-inch-minus ballast.

**0-5 RECONSTRUCTION**

Reconstruction includes, but is not limited to clearing, grubbing, excavation and embankment to subgrade, landing and turnout construction, culvert installation and application of 3-inch-minus ballast.



**0-6 PRE-HAUL MAINTENANCE**

This project includes, but is not limited to the following pre-haul maintenance requirements:

<u>Road</u>	<u>Stations</u>	<u>Requirements</u>
BR-ML	0+00 to 332+12	- Brushing*, Grading - Spot patching - Culvert installation
BR-38	0+00 to 47+82	- Brushing*, Grading - Culvert installation
BR-38	47+82 to 72+40	- Brushing*, Grading - Intersection repair: see detail - Application of 3" of 2" minus
BR-38	72+40 to 119+75	- Brushing*, Grading - Spot patching
BR-3802	0+00 to 79+21	- Brushing*, Grading - Spot patch
BR-3802-05	0+00 to 20+02	- Brushing*, Grading
BR-3823	0+00 to 11+74	- Brushing*, Grading - Application of 3" of 2" minus
BR-3823	11+74 to 26+22	- Brushing*, Grading - Spot patch
BR-50	0+00 to 21+97	- Brushing*, Grading
BR-50	21+97 to 40+95	- Brushing*, Grading - Application of 3" of 2" minus
BR-63	0+00 to 27+80	- Brushing*, Grading
BR-63	27+80 to 43+40	- Brushing*, Grading - Application of 3" of 2" minus

\*The Contract Administrator may direct the Purchaser to conduct brushing prior to all other road building activities, prior to log haul or to delay brushing until post-haul maintenance activities.

**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 may develop an existing rock source. Rock source development will involve stripping, drilling, shooting and processing rock. Work for developing rock sources is listed in Section 6 ROCK AND SURFACING.

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 the submitted 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



**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. Road Plan Clauses.
3. Typical Section Sheet.
4. Standard Lists.
5. Standard Details.

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.

**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.

**1-15 ROAD MARKING**

Purchaser shall perform road work in accordance with the state's marked location. All road work is marked as follows:

- Orange flagging and/or stakes for road centerline

**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**

Purchaser shall notify the Contract Administrator a minimum of 3 business days before work begins.

**1-23 ROAD WORK PHASE APPROVAL**

Purchaser shall obtain written approval from the Contract Administrator upon completion of each of the following phases of road work:

- Subgrade construction and compaction
- Drainage installation
- Rock application and compaction

**1-25 ACTIVITY TIMING RESTRICTION**

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

<u>Road</u>	<u>Activity</u>	<u>Closure Period</u>
ALL ROADS	ALL ACTIVITIES	November 1 to March 31

**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 designated maintainer roads, a joint operating plan must be developed. All parties shall follow this plan.

Purchaser’s maintenance plan must include a total volume of rock that will be provided at the Purchaser’s expense in addition to what is specified in this road plan. This rock shall be available before permission is granted to operate during the closure period and will be used as necessary along the haul route. The Contract Administrator may direct the Purchaser where to apply this maintenance rock.

Rock from stockpiles may not be used for out of season maintenance.

**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.

### **1-33 SNOW PLOWING RESTRICTION**

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

### **1-40 ROAD APPROACHES TO COUNTY ROADS AND STATE HIGHWAYS**

Purchaser shall immediately remove any mud, dirt, rock, or other material tracked or spilled on to county roads and state highways.

If additional damage to the surface, signs, guardrails, etc. occurs then the damage will be repaired, at the Purchaser's expense, as directed by the Contract Administrator when authorized by the county or WSDOT.

## 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.

### **2-3 ROAD MAINTENANCE – DESIGNATED MAINTAINER**

Purchaser may be required to perform maintenance on roads listed in Contract Clause C-060 DESIGNATED ROAD MAINTAINER as directed by the Contract Administrator. Purchaser shall maintain roads in accordance with FOREST ACCESS ROAD MAINTENANCE SPECIFICATIONS.

### **2-4 PASSAGE OF LIGHT VEHICLES**

Purchaser shall maintain all roads in a condition that will allow the passage of light administrative vehicles.

### **2-5 MAINTENANCE GRADING – EXISTING ROAD**

On all haul roads, Purchaser shall use a grader to shape the existing surface before timber haul.

## SECTION 3 – CLEARING, GRUBBING, AND DISPOSAL

### 3-1 BRUSHING

On all haul roads, 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.

The Contract Administrator may direct the Purchaser to conduct brushing prior to all other road building activities, prior to log haul or to delay brushing until post-haul maintenance activities.

### 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 and within waste and debris areas, 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.

### 3-8 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 50%.
- Against standing trees.

### 3-10 GRUBBING

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

### 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 and BRUSHING DETAIL.

### **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 are located within the cleared right-of-way or in natural openings as designated or 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
- 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 slopes greater than 45%, Purchaser shall end haul or push organic debris to the designated waste areas specified in Clause 3-22 DESIGNATED WASTE AREA FOR ORGANIC DEBRIS.

## 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.
- Maximum grades may not exceed 18 percent favorable and 15 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.

### 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%.
- Maximum favorable grades for switchbacks is 12%.
- Maximum transition grades entering and leaving switchbacks is a 5% 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:

<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 (on side slopes 56-70%)	¾:1	150
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:

<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, and where side slopes exceed 45%, Purchaser shall use full bench construction for the entire subgrade width. Purchaser shall end haul waste material to the location specified in Clause 4-37 WASTE AREA LOCATION.

<u>Road</u>	<u>Full Bench Location</u>	<u>Comments</u>
BR-3823-05	33+45 to 36+15	Haul waste to 30+54

**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.



**4-22 TURNAROUNDS**

Purchaser shall construct turnarounds in accordance with the TURNAROUND DETAIL on all roads. Turnarounds must be no larger than 30 feet long and 30 feet wide. Locations are subject to written approval by the Contract Administrator.

**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.

**4-27 DITCH WORK – MATERIAL USE PROHIBITED**

Purchaser shall not pull ditch material across the road or mix in with the road surface. Excavated material must be end hauled to the location specified in Clauses 4-36 through 4-38.

**4-28 DITCH DRAINAGE**

Ditches must drain to cross-drain culverts or ditchouts.

**4-29 DITCHOUTS**

Purchaser shall construct ditchouts as identified on the MATERIALS LIST and as needed and 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 55% if the waste material is compacted and free of organic debris. On side slopes greater than 55%, all waste material must be end hauled or pushed to the designated embankment sites identified by the Contract administrator.

**4-37 WASTE AREA LOCATION**

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

<u>Road</u>	<u>Waste Area Location</u>	<u>Comments</u>
BR-3802-05	30+54	Use waste to build up grade

#### **4-38 PROHIBITED WASTE DISPOSAL AREAS**

Purchaser shall not deposit waste material in the following areas:

- Within 50 feet of a cross drain culvert.
- Within 100 feet of a live stream or wetland.
- In locations that interfere with the construction of the road prism.
- In locations that impede drainage.
- Against standing timber.
- Outside the clearing limits.

#### **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.

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 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.

**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>
Reconstruction or new construction roads.	Two: 18" x 30' culvert

**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. 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 stream crossing culverts, Purchaser shall place riprap 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 or as directed by the Contract Administrator. Rock may not restrict the flow of water into culvert inlets or catch basins. Placement must be by zero-drop-height method only. No placement by end dumping or dropping of rock is allowed.

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 sources 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 sources, a joint operating plan must be developed. All parties shall follow this plan.

<u>Source</u>	<u>Location</u>	<u>Rock Type</u>
WEST BEAR PIT	20+02 of the BR-3802-05	2-Inch minus surfacing, 3-Inch minus ballast, Riprap
MID BEAR PIT*	5+75 of the BR-59	3-Inch minus ballast, Riprap
GREENSTONE PIT*	4+60 of the BR-6307	3-Inch minus ballast, Riprap

\*The MID BEAR and GREENSTONE rock pits are optional, proposed new rock sources.

**6-3 ROCK SOURCE STATE LAND, EXISTING STOCKPILE**

Rock used in accordance with the quantities on the TYPICAL SECTION and MATERIALS LIST may be obtained from the following existing stockpile on state land at no charge to the Purchaser. Purchaser shall not remove additional yardage without prior written approval from the Contract Administrator.

<u>Source</u>	<u>Rock Type</u>	<u>Quantity</u>	<u>Comment</u>
WEST BEAR PIT	2-Inch minus surfacing	1,340	To be created with <i>Bald Balcony</i> Timber Sale: 30-104331

**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.

**6-10 ROCK SOURCE DEVELOPMENT PLAN BY STATE**

Purchaser shall conduct rock source development and use at the following sources, in accordance with the written ROCK SOURCE DEVELOPMENT PLAN prepared by the state and included in this road plan. 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.

<u>Source</u>	<u>Rock Type</u>
WEST BEAR PIT	3-Inch minus ballast, Riprap

**6-11 ROCK SOURCE DEVELOPMENT PLAN BY PURCHASER**

Purchaser shall conduct rock source development and use at the following sources, 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.

<u>Source</u>	<u>Rock Type</u>	<u>Comment</u>
MID BEAR PIT	3-Inch minus ballast, Riprap	Use the attached LiDAR based pitplan template.
GREENSTONE PIT		

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.
- Rock source reclamation plan describing how the area will be left in a condition that will ensure public safety and minimize environmental impacts.

**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.

**6-14 DRILL AND SHOOT**

Rock drilling and shooting must meet the following specifications:

- Oversize material remaining in the rock source at the conclusion of the timber sale may not exceed 5% of the total volume mined in that source.
- Oversize material is defined as rock fragments too large to be converted by the Purchaser to a size that will meet specifications used for the roads in this sale.
- All operations must be carried out in compliance with 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 the Safety Standards for Construction Work (296-155 WAC), Washington Department of Labor and Industries.
- Purchaser shall block access roads before blasting operations.

**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

**6-30 2-INCH MINUS CRUSHED ROCK**

% Passing 2" square sieve	100%
% Passing 1" square sieve	55 - 75%
% Passing U.S. #4 sieve	20 - 45%

Of the fraction passing the No. 4 sieve, 40% to 60% must pass the No. 10 sieve.

The portion of aggregate retained on the No. 4 sieve may not contain more than 0.2 percent organic debris and trash. All percentages are by weight.

**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.

**6-42 SHOTROCK**

No more than 10 percent of the rock by weight may exceed 8 inches in any dimension and no rock may be larger than 12 inches in any dimension. Shotrock rock may not contain more than 5 percent by weight of organic debris, dirt, and trash.

**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 depths 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.

**6-75 OPTIONAL ROCK EXCEPTION**

On the temporary roads, if hauling takes place from May 1 to September 30 Purchaser may provide and place less rock than shown on the TYPICAL SECTION and MATERIALS LIST, when approved in writing by the Contract Administrator.

If less rock is applied, Purchaser shall submit a written plan, for approval, describing how these roads will be constructed, used, maintained, and treated post-haul. Purchaser shall meet post-haul specifications in Section 9 POST-HAUL ROAD WORK, the FOREST ACCESS ROAD MAINTENANCE SPECIFICATIONS, or other conditions of the approved plan.

**SECTION 8 – EROSION CONTROL**

**8-2 PROTECTION FOR EXPOSED SOIL**

Purchaser shall provide and evenly spread a 3-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.

**8-15 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 seed and 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 addition cost to the state.

**8-25 GRASS SEED**

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.

<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

**8-27 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 and as specified below.

**9-10 LANDING DRAINAGE**

Purchaser shall provide for drainage of the landing surface.

**9-11 LANDING EMBANKMENT**

Purchaser shall slope landing embankments to the original construction specifications.

### 9-21 ROAD ABANDONMENT

Purchaser shall abandon the following roads before the termination of this contract.

<u>Road</u>	<u>Stations</u>	<u>Comment</u>
BR-3802-1503	0+00 to 4+71	
BR-5804	0+00 to 2+45	
BR-59	0+00 to 7+71	
BR-6307-04	0+00 to 11+88	
BR-6307-05	0+00 to 13+13	From 5+02 (stream) to 11+50 (unit boundary), Purchaser shall rip and scarify road surface to a depth of 6 inches.

### 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.

## SECTION 10 MATERIALS

### 10-2 GEOTEXTILE FOR SEPARATION

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

	<u>ASTM Test</u>	<u>Requirements</u>
Type	--	Non-woven
Apparent opening size	D 4751	No. 30 max
Water permittivity	D 4491	0.02 sec <sup>-1</sup>
Grab tensile strength	D 4632	160 lb
Grab tensile elongation	D 4632	>= 50%
Puncture strength	D 6241	310 lb
Tear strength	D 4533	50 lb
Ultraviolet stability	D 4355	50% retained after 500 hours of exposure

### 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).

### 10-17 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**

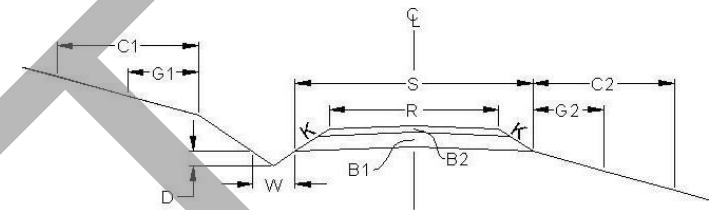
Metal culverts must conform to the following specifications for gage and corrugation as a function of diameter.

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

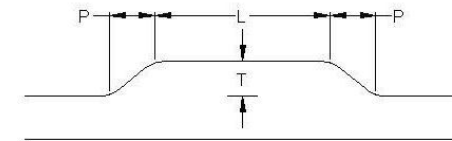
DRAFT

ROAD #		BR-ML	BR-38	BR-38	BR-38
REQUIRED / OPTIONAL		REQUIRED	REQUIRED	REQUIRED	REQUIRED
CONSTRUCT / RECONSTRUCT		PREHAUL	PREHAUL	PREHAUL	PREHAUL
TOLERANCE CLASS (A/B/C)		C	C	C	C
STATION / MP TO		0+00	0+00	47+82	72+40
STATION / MP		332+12	47+82	72+40	119+75
ROAD WIDTH	R	12	12	12	12
CROWN (INCHES @ C/L)		3	3	3	3
DITCH WIDTH	W	3	3	3	3
DITCH DEPTH	D	1	1	1	1
TURNOUT LENGTH	L	--	--	--	--
TURNOUT WIDTH	T	--	--	--	--
TURNOUT TAPER	P	--	--	--	--
GRUBBING	G1	--	--	--	--
	G2	--	--	--	--
CLEARING	C1	--	--	--	--
	C2	--	--	--	--
ROCK FILLSLOPE	K:1	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1
❖ BALLAST DEPTH	B1	--	--	--	--
CUBIC YARDS / STATION		--	--	--	--
➤ TOTAL CY BALLAST		--	--	--	--
❖ SURFACING DEPTH	B2	--	--	3	--
CUBIC YARDS / STATION		--	--	17	--
➤ TOTAL CY SURFACING		--	--	420	--
➤ TOTAL CUBIC YARDS		50 <sup>A</sup>	30 <sup>A</sup>	420 <sup>A</sup>	30 <sup>A</sup>
SUBGRADE WIDTH	S	12	12	12.5	12
BRUSHCUT (Y/N)		Y	Y	Y	Y
BLADE, SHAPE, & DITCH (Y/N)		Y	Y	Y	Y

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.

Rock Totals Summary

Type	Quantity (Cubic Yards)
A: 2-Inch Minus Crushed	1,340
B: 3-Inch Minus Ballast	15,990
Shotrock	40
Rip Rap	632

ROAD #		BR-3802	BR-3802-05	BR-3802-15	BR-3802-15	BR-3802-1503	BR-3823	BR-3823	BR-3823-05
REQUIRED / OPTIONAL		REQUIRED	REQUIRED	REQUIRED	REQUIRED	OPTIONAL	REQUIRED	REQUIRED	REQUIRED
CONSTRUCT / RECONSTRUCT		PREHAUL	PREHAUL	RECONSTRUCT	CONSTRUCT	RECONSTRUCT	PREHAUL	PREHAUL	RECONSTRUCT
TOLERANCE CLASS (A/B/C)		C	C	C	C	C	C	C	C
STATION / MP TO		0+00	0+00	0+00	28+48	0+00	0+00	11+74	0+00
STATION / MP		79+21	20+02	28+48	31+85	4+71	11+74	26+22	19+48
ROAD WIDTH	R	12	12	12	12	12	12	12	12
CROWN (INCHES @ C/L)		3	3	3	3	3	3	3	3
DITCH WIDTH	W	3	3	3	3	2	3	3	3
DITCH DEPTH	D	1	1	1	1	1	1	1	1
TURNOUT LENGTH	L	--	--	50	--	--	--	--	50
TURNOUT WIDTH	T	--	--	10	--	--	--	--	10
TURNOUT TAPER	P	--	--	25	--	--	--	--	25
GRUBBING	G1	--	--	5	5	5	--	--	5
	G2	--	--	5	5	5	--	--	5
CLEARING	C1	--	--	10	10	10	--	--	10
	C2	--	--	10	10	10	--	--	10
ROCK FILLSLOPE	K:1	1 ½ : 1	--	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1
❖ BALLAST DEPTH	B1	--	--	6	12	12	--	--	6
CUBIC YARDS / STATION		--	--	34	72	72	--	--	34
➤ TOTAL CY BALLAST		--	--	970	245	340	--	--	660
❖ SURFACING DEPTH	B2	--	--	--	--	--	3	--	--
CUBIC YARDS / STATION		--	--	--	--	--	17	--	--
➤ TOTAL CY SURFACING		--	--	--	--	--	200	--	--
➤ TOTAL CUBIC YARDS		10 <sup>A</sup>	--	970 <sup>B</sup>	245 <sup>B</sup>	340 <sup>B</sup>	200 <sup>A</sup>	10 <sup>A</sup>	660 <sup>B</sup>
SUBGRADE WIDTH	S	12	12	13.5	14.5	14.5	12.5	12	13.5
BRUSHCUT (Y/N)		Y	Y	N	N	N	Y	Y	N
BLADE, SHAPE, & DITCH (Y/N)		Y	Y	N	N	N	Y	Y	N



ROAD #		BR-3823-05	BR-50	BR-50	BR-5008	BR-58	BR-5804	BR-59	BR-63
REQUIRED / OPTIONAL		REQUIRED	REQUIRED	REQUIRED	REQUIRED	REQUIRED	OPTIONAL	OPTIONAL	REQUIRED
CONSTRUCT / RECONSTRUCT		CONSTRUCT	PREHAUL	PREHAUL	CONSTRUCT	CONSTRUCT	CONSTRUCT	CONSTRUCT	PREHAUL
TOLERANCE CLASS (A/B/C)		C	C	C	C	C	C	C	C
STATION / MP TO		19+48	0+00	21+97	0+00	0+00	0+00	0+00	0+00
STATION / MP		43+79	21+97	40+95	14+30	22+47	2+45	7+71	27+80
ROAD WIDTH	R	12	12	12	12	12	12	12	12
CROWN (INCHES @ C/L)		3	3	3	3	3	3	3	3
DITCH WIDTH	W	3	3	3	3	3	3	3	3
DITCH DEPTH	D	1	1	1	1	1	1	1	1
TURNOUT LENGTH	L	50	--	--	50	50	--	--	--
TURNOUT WIDTH	T	10	--	--	10	10	--	--	--
TURNOUT TAPER	P	25	--	--	25	25	--	--	--
GRUBBING	G1	5	--	--	5	5	--	--	--
	G2	5	--	--	5	5	--	--	--
CLEARING	C1	10	--	--	10	10	--	--	--
	C2	10	--	--	10	10	--	--	--
ROCK FILLSLOPE	K:1	1 ½ : 1	--	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1	--
❖ BALLAST DEPTH	B1	18	--	--	18	18	12	18	--
CUBIC YARDS / STATION		114	--	--	114	114	72	114	--
➤ TOTAL CY BALLAST		2,770	--	--	1,630	2,560	175	880	--
❖ SURFACING DEPTH	B2	--	--	3	--	--	--	--	--
CUBIC YARDS / STATION		--	--	17	--	--	--	--	--
➤ TOTAL CY SURFACING		--	--	325	--	--	--	--	--
➤ TOTAL CUBIC YARDS		2,770 <sup>B</sup>	--	325 <sup>A</sup>	1,630 <sup>B</sup>	2,560 <sup>B</sup>	175 <sup>B</sup>	880 <sup>B</sup>	--
SUBGRADE WIDTH	S	16.5	12	12.5	16.5	16.5	14.5	16.5	12
BRUSHCUT (Y/N)		N	Y	Y	N	N	N	N	Y
BLADE, SHAPE, & DITCH (Y/N)		N	Y	Y	N	N	N	N	Y

ROAD #		BR-63	BR-6307	BR-6307	BR-6307	BR-6307-04	BR-6307-05		
REQUIRED / OPTIONAL		REQUIRED	REQUIRED	REQUIRED	REQUIRED	OPTIONAL	OPTIONAL		
CONSTRUCT / RECONSTRUCT		PREHAUL	CONSTRUCT	RECONSTRUCT	CONSTRUCT	CONSTRUCT	RECONSTRUCT		
TOLERANCE CLASS (A/B/C)		C	C	C	C	C	C		
STATION / MP TO		27+80	0+00	13+63	23+94	0+00	0+00		
STATION / MP		43+40	13+63	23+94	40+73	11+88	13+13		
ROAD WIDTH	R	12	12	12	12	3	3		
CROWN (INCHES @ C/L)		3	3	3	3	3	3		
DITCH WIDTH	W	3	3	3	3	1	1		
DITCH DEPTH	D	1	1	1	1	--	--		
TURNOUT LENGTH	L	--	50	50	50	--	--		
TURNOUT WIDTH	T	--	10	10	10	--	--		
TURNOUT TAPER	P	--	25	25	25	--	--		
GRUBBING	G1	--	5	5	5	--	--		
	G2	--	5	5	5	--	--		
CLEARING	C1	--	10	10	10	--	--		
	C2	--	10	10	10	--	--		
ROCK FILLSLOPE	K:1	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1	1 ½ : 1		
❖ BALLAST DEPTH	B1	--	18	12	18	12	9		
CUBIC YARDS / STATION		--	114	72	114	72	53		
➤ TOTAL CY BALLAST		--	1,555	740	1,915	855	695		
❖ SURFACING DEPTH	B2	3	--	--	--	--	--		
CUBIC YARDS / STATION		17	--	--	--	--	--		
➤ TOTAL CY SURFACING		265	--	--	--	--	--		
➤ TOTAL CUBIC YARDS		265 <sup>A</sup>	1,555 <sup>B</sup>	740 <sup>B</sup>	1,915 <sup>B</sup>	855 <sup>B</sup>	695 <sup>B</sup>		
SUBGRADE WIDTH	S	12.5	16.5	14.5	16.5	14.5	14		
BRUSHCUT (Y/N)		Y	N	N	N	N	N		
BLADE, SHAPE, & DITCH (Y/N)		Y	N	N	N	N	N		

## MATERIALS LIST

LOCATION		CULVERT			DWNST		RIPRAP			FILL TYPE	TOLERANCE	REMARKS											
ROAD #	STATION	DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE														
<p><b>Note:</b> Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Diameter</th> <th style="text-align: center;">Gage</th> <th style="text-align: center;">Corrugation</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">18"</td> <td style="text-align: center;">16</td> <td style="text-align: center;">2 2/3" x 1/2"</td> </tr> <tr> <td style="text-align: center;">24" – 48"</td> <td style="text-align: center;">14</td> <td style="text-align: center;">2 2/3" x 1/2"</td> </tr> <tr> <td style="text-align: center;">54" – 96"</td> <td style="text-align: center;">14</td> <td style="text-align: center;">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"																					
BR-ML	261+69	--	--	--	--	--	--	--	--	--	--	10 Yards spot patch											
BR-ML	290+79	18	30	PD	--	--	2	3	L	NT	C	Cover with 20 yards 2" minus spread for 75'											
BR-ML	308+96	18	30	PD	--	--	2	3	L	NT	C	Cover with 10 yards 2" minus											
BR-ML	311+61	18	30	PD	--	--	2	3	L	NT	C	Cover with 10 yards 2" minus											
BR-38	31+54	18	30	PD	--	--	2	3	L	NT	C	Cover with 10 yards 2" minus											
BR-38	47+60	--	--	--	--	--	60 - RR 40 - SR	--	--	--	--	BR-38 & BR-3809 Intersection repair. Begin rock lift.											
BR-38	54+24	18	30	PD	--	--	2	3	L	NT	C	Collect water draining down trail											
BR-38	82+36	--	--	--	--	--	--	--	--	--	--	10 Yards spot patch											
BR-38	86+54	--	--	--	--	--	--	--	--	--	--	10 Yards spot patch											
BR-38	108+15	--	--	--	--	--	--	--	--	--	--	10 Yards spot patch											
BR-3802	66+98	--	--	--	--	--	--	--	--	--	--	10 Yards spot patch											
BR-3802-15	2+14	36	50	GM	--	--	5	10	L/H	NT	C	Type 4 stream											
BR-3802-15	2+88	18	30	PD	--	--	2	3	L	NT	C												
BR-3802-15	6+87	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-3802-15	7+65	18	30	PD	--	--	2	3	L	NT	C												
BR-3802-15	11+02	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-3802-15	13+36	30	36	GM	--	--	3	7	L/H	NT	C	Type 4 stream											
BR-3802-15	14+14	18	30	PD	--	--	2	3	L	NT	C												

GM – Galvanized Metal    PS – Polyethylene Pipe Single Wall    PD – Polyethylene Pipe Dual Wall    AM – Aluminized Metal    C – Concrete    XX – PD or GM  
H – Heavy Loose Riprap    L – Light Loose Riprap    SR – Shot Rock    NT – Native (Bank Run)    QS – Quarry Spalls

## MATERIALS LIST

LOCATION		CULVERT			DWNSPT		RIPRAP			FILL TYPE	TOLERANCE	REMARKS											
ROAD #	STATION	DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE														
<p><b>Note:</b> Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Diameter</th> <th style="text-align: center;">Gage</th> <th style="text-align: center;">Corrugation</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">18"</td> <td style="text-align: center;">16</td> <td style="text-align: center;">2 2/3" x 1/2"</td> </tr> <tr> <td style="text-align: center;">24" – 48"</td> <td style="text-align: center;">14</td> <td style="text-align: center;">2 2/3" x 1/2"</td> </tr> <tr> <td style="text-align: center;">54" – 96"</td> <td style="text-align: center;">14</td> <td style="text-align: center;">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"																					
BR-3802-15	19+32	18	30	PD	--	--	2	3	L	NT	C												
BR-3802-15	20+83	30	30	XX	--	--	3	5	L/H	NT	C	Type 4 stream											
BR-3802-15	23+09	18	30	PD	--	--	2	3	L	NT	C												
BR-3802-15	25+16	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-3802-15	28+78	18	30	PD	--	--	2	3	L	NT	C												
BR-3802-15	29+58	30	54	XX	--	--	5	10	L/H	NT	C	Type 4 stream											
BR-3802-15	30+83	18	30	PD	--	--	2	3	L	NT	C												
BR-3802-1503	1+51	18	30	XX	--	--	2	3	L	NT	C												
BR-3802-1503	2+61	18	30	XX	--	--	2	3	L	NT	C												
BR-3823	22+96	--	--	--	--	--	--	--	--	--	--	10 Yards spot patch											
BR-3823-05	4+63	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	7+18	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	10+88	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	12+01	30	30	XX	--	--	3	5	L/H	NT	C	Type 4 stream											
BR-3823-05	13+56	30	30	XX	--	--	3	5	L/H	NT	C	Type 4 stream											
BR-3823-05	14+98	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	19+76	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	20+74	18	30	PD	--	--	2	3	L	NT	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														
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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"																					
BR-3823-05	22+40	18	30	PD	--	--	2	3	L	NT	C	Type 5 Stream											
BR-3823-05	23+01	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	24+34	--	--	--	--	--	--	--	--	--	--	Begin laying geofabric											
BR-3823-05	24+81	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-3823-05	25+28	18	30	PD	--	--	2	3	L	NT	C	End laying geofabric											
BR-3823-05	28+06	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	28+86	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	32+50	18	30	PD	--	--	2	3	L	NT	C												
BR-3823-05	33+50	18	40	PD	--	--	2	3	L	NT	C												
BR-3823-05	38+08	18	36	PD	--	--	2	3	L	NT	C												
BR-3823-05	41+51	18	30	PD	--	--	2	3	L	NT	C												
BR-5008	0+30	18	50	PD	--	--	2	3	L	NT	C	Ditchlay											
BR-5008	1+96	60	38	GM	--	--	5	10	L/H	NT	C	Type 4 stream											
BR-5008	2+86	30	40	XX	--	--	3	5	L/H	NT	C	Type 4 stream											
BR-5008	3+29	18	30	PD	--	--	2	3	L	NT	C												
BR-5008	5+84	18	30	PD	--	--	2	3	L	NT	C												
BR-5008	7+66	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-5008	8+93	18	40	PD	--	--	2	3	L	NT	C												
BR-5008	10+60	18	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-5008	11+90	24	44	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-5008	13+61	18	30	PD	--	--	2	3	L	NT	C												

GM – Galvanized Metal    PS – Polyethylene Pipe Single Wall    PD – Polyethylene Pipe Dual Wall    AM – Aluminized Metal    C – Concrete    XX – PD or GM  
 H – Heavy Loose Riprap    L – Light Loose Riprap    SR – Shot Rock    NT – Native (Bank Run)    QS – Quarry Spalls

## MATERIALS LIST

LOCATION		CULVERT			DWNST		RIPRAP			FILL TYPE	TOLERANCE	REMARKS											
ROAD #	STATION	DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE														
<p><b>Note:</b> Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Diameter</th> <th style="text-align: center;">Gage</th> <th style="text-align: center;">Corrugation</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">18"</td> <td style="text-align: center;">16</td> <td style="text-align: center;">2 2/3" x 1/2"</td> </tr> <tr> <td style="text-align: center;">24" – 48"</td> <td style="text-align: center;">14</td> <td style="text-align: center;">2 2/3" x 1/2"</td> </tr> <tr> <td style="text-align: center;">54" – 96"</td> <td style="text-align: center;">14</td> <td style="text-align: center;">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"																					
BR-58	10+97	72	46	GM	--	--	5	10	L/H	NT	C	Type 4 stream											
BR-58	12+23	18	30	PD	--	--	2	3	L	NT	C												
BR-58	13+97	18	30	PD	--	--	2	3	L	NT	C												
BR-58	15+84	18	30	PD	--	--	2	3	L	NT	C												
BR-58	17+89	18	30	PD	--	--	2	3	L	NT	C												
BR-58	18+63	18	30	PD	--	--	2	3	L	NT	C												
BR-58	20+57	18	30	PD	--	--	2	3	L	NT	C												
BR-5804	1+22	24	30	XX	--	--	2	3	L	NT	C	Type 5 stream											
BR-59	1+37	24	30	XX	--	--	2	3	L	NT	C	Type 5 stream											
BR-59	1+90	18	30	XX	--	--	2	3	L	NT	C												
BR-59	2+96	18	30	XX	--	--	2	3	L	NT	C												
BR-59	4+91	18	30	XX	--	--	2	3	L	NT	C												
BR-59	6+85	18	30	XX	--	--	2	3	L	NT	C												
BR-6307	1+62	18	36	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-6307	4+13	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-6307	6+74	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	7+81	24	30	PD	--	--	2	3	L	NT	C	Type 4 stream											
BR-6307	9+33	84	60	GM	--	--	10	15	L/H	NT	C	Type 4 stream											

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## MATERIALS LIST

LOCATION		CULVERT			DWNSPT		RIPRAP			FILL TYPE	TOLERANCE	REMARKS											
ROAD #	STATION	DIAMETER	LENGTH	TYPE	LENGTH	TYPE	INLET	OUTLET	TYPE														
											<b>Note:</b> Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:												
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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"																					
BR-6307	12+31	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	13+55	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	16+42	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	19+23	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	20+51	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-6307	21+88	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-6307	23+19	18	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-6307	23+80	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	25+90	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	26+65	60	40	GM	--	--	5	10	L/H	NT	C	Type 4 stream											
BR-6307	29+98	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-6307	31+63	72	40	GM	--	--	5	10	L/H	NT	C	Type 4 stream											
BR-6307	33+35	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	36+13	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	36+55	24	30	PD	--	--	2	3	L	NT	C	Type 5 stream											
BR-6307	37+83	18	30	PD	--	--	2	3	L	NT	C												
BR-6307	39+22	18	30	PD	--	--	2	3	L	NT	C	Do not send water down old road grade											
BR-6307-04	1+01	24	30	XX	--	--	2	3	L	NT	C	Type 5 stream											
BR-6307-04	1+57	18	30	XX	--	--	2	3	L	NT	C												
BR-6307-04	2+53	18	30	XX	--	--	2	3	L	NT	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			Note: Galvanized metal culverts shall conform to the following specifications for gage and corrugation as a function of the diameter:			
												Diameter	Gage	Corrugation	
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												24" – 48"	14	2 2/3" x 1/2"	
												54" – 96"	14	3" x 1"	
BR-6307-04	4+62	18	30	XX	--	--	2	3	L	NT	C				
BR-6307-04	6+54	24	40	XX	--	--	2	3	L	NT	C		Type 5 stream		
BR-6307-04	7+75	18	30	XX	--	--	2	3	L	NT	C				
BR-6307-04	9+31	24	30	XX	--	--	2	3	L	NT	C		Type 5 stream		
BR-6307-04	9+97	18	30	XX	--	--	2	3	L	NT	C				
BR-6307-05	2+08	18	30	XX	--	--	2	3	L	NT	C				
BR-6307-05	4+42	24	30	XX	--	--	2	3	L	NT	C		Type 5 stream		
BR-6307-05	5+08	30	30	XX	--	--	2	3	L	NT	C		Type 4 stream		

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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.

## FOREST ACCESS ROAD MAINTENANCE SPECIFICATIONS

### Preventative Maintenance

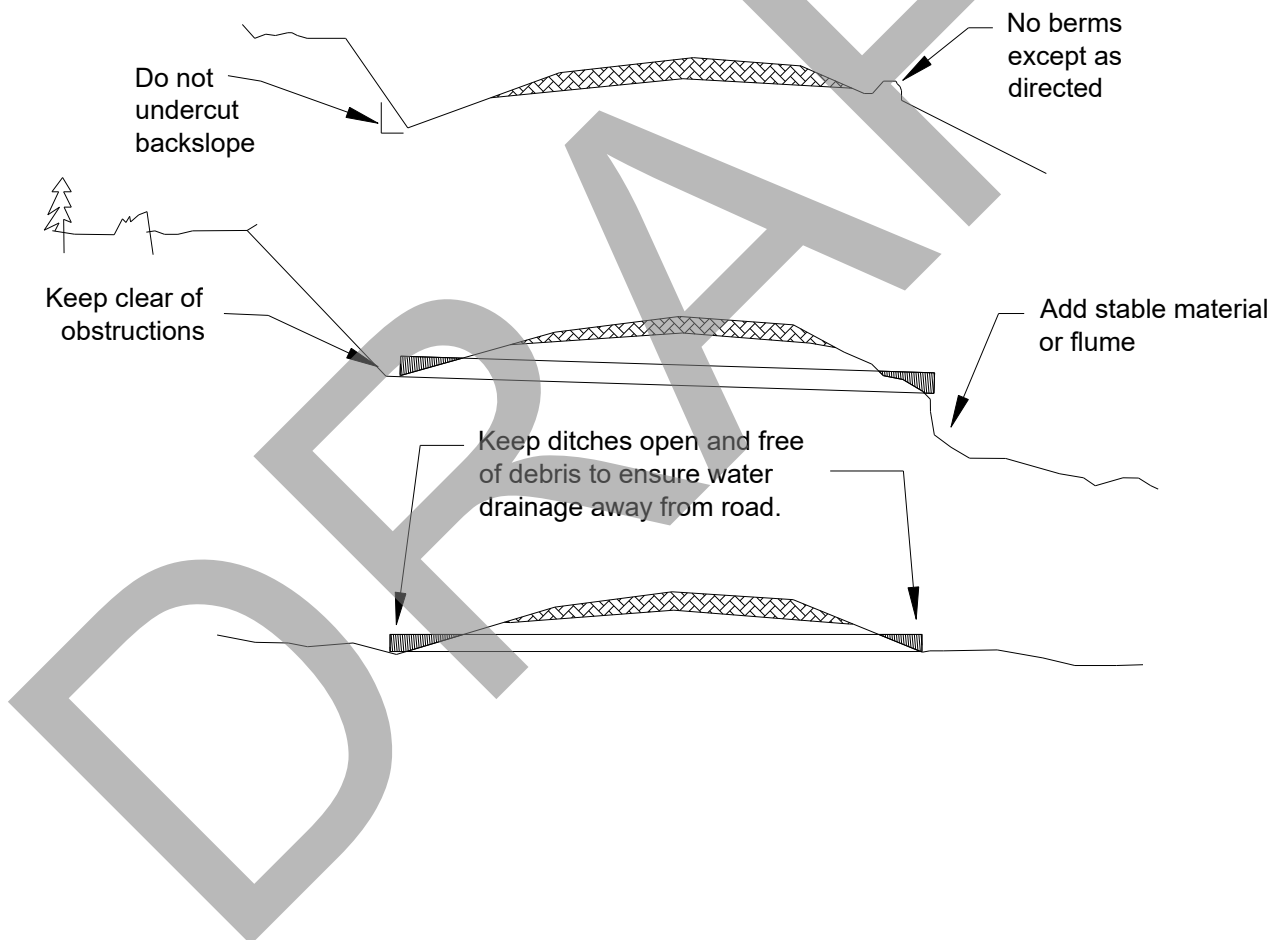
- Perform preventative maintenance work to safeguard against storm damage, such as blading to ensure correct runoff, ditch and culvert cleaning, and waterbar maintenance.

### Termination of Use or End of Season

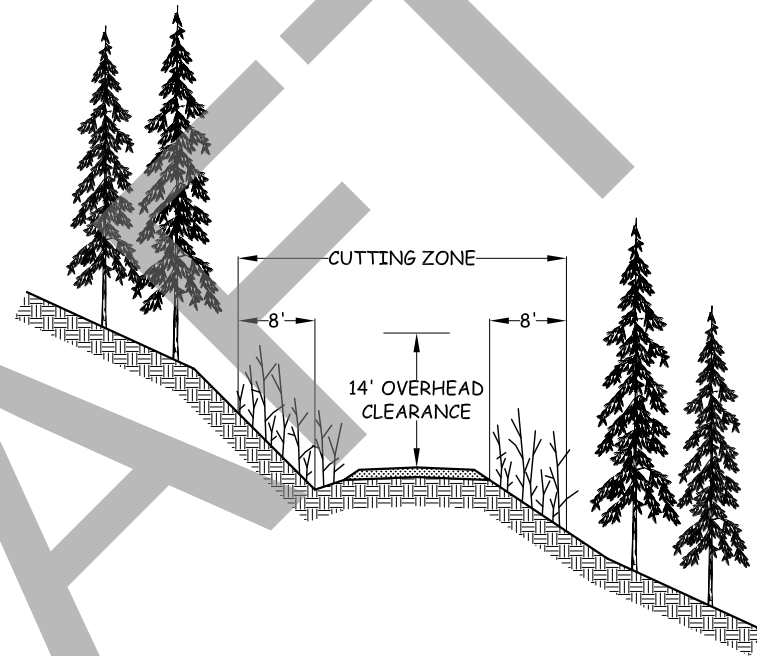
- At the conclusion of logging operations, ensure all conditions of these specifications have been met.

### Debris

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



## 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.

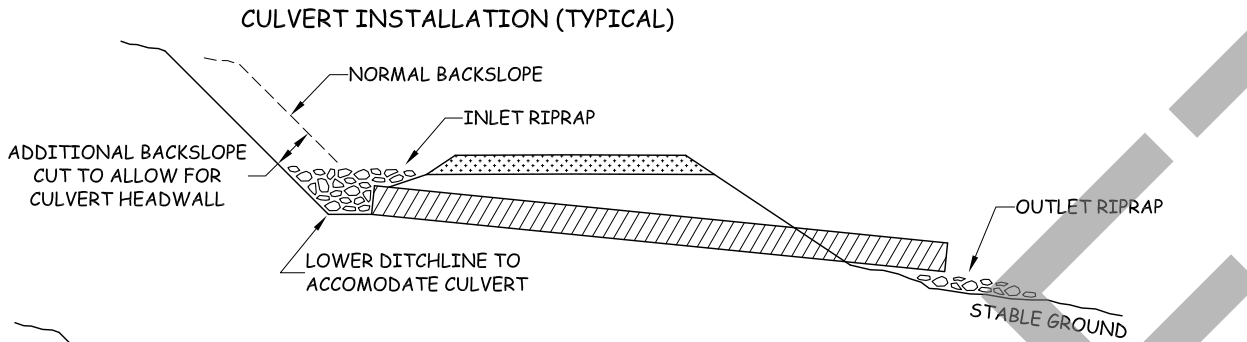
CULVERT INLETS AND OUTLETS SHALL BE CLEANED A MINIMUM DISTANCE OF TWO PIPE DIAMETERS AWAY.

CONTRACT #  
30-106183

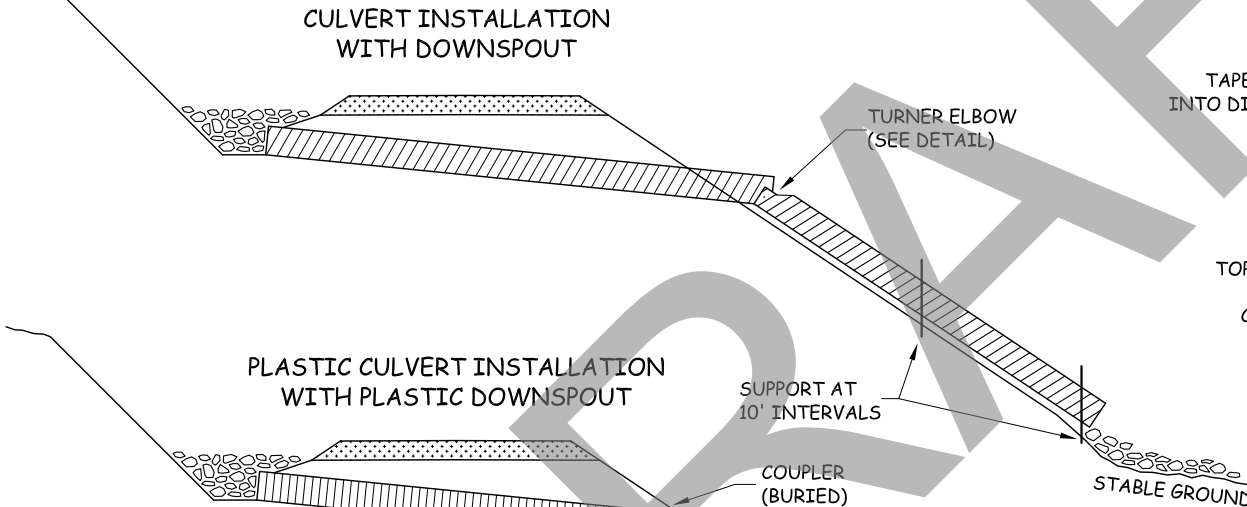
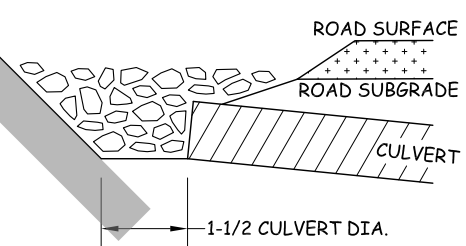
PROJECT  
GREENSTONE

SHEET  
40 OF 45

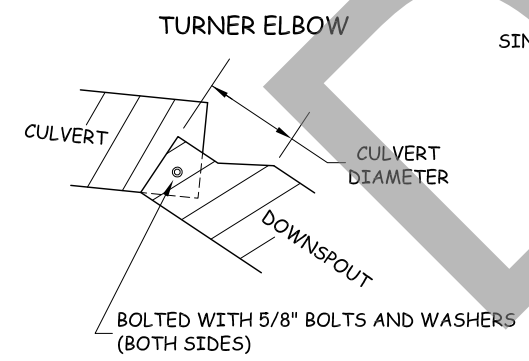
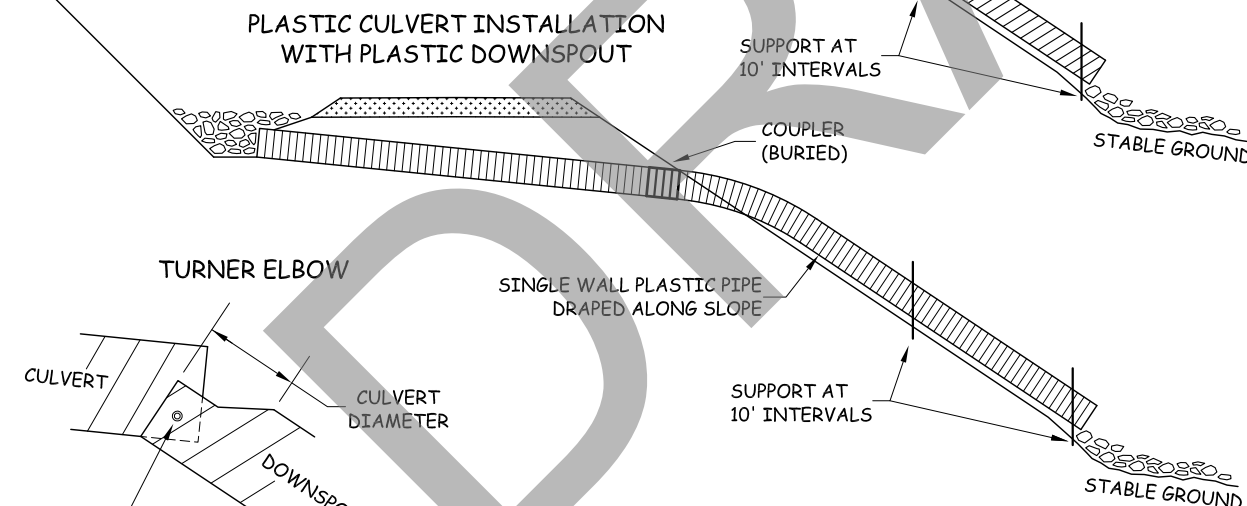
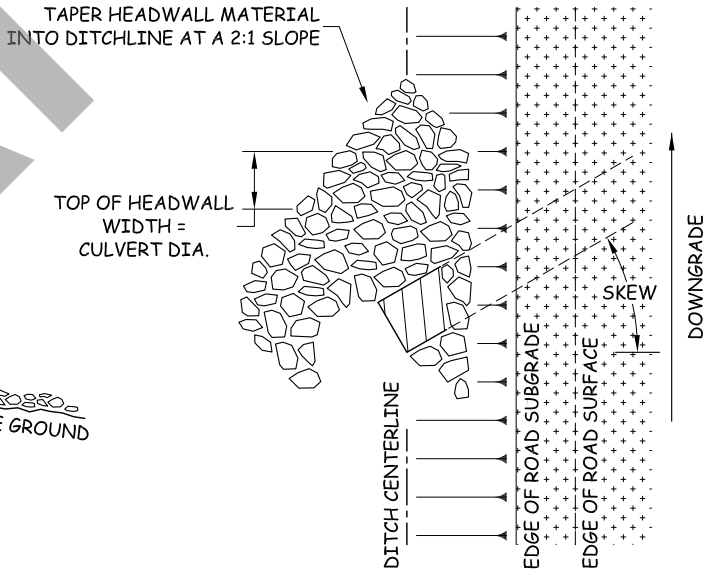
# CULVERT AND DRAINAGE SPECIFICATIONS



CULVERT HEADWALL - SECTION VIEW



CULVERT HEADWALL - PLAN VIEW

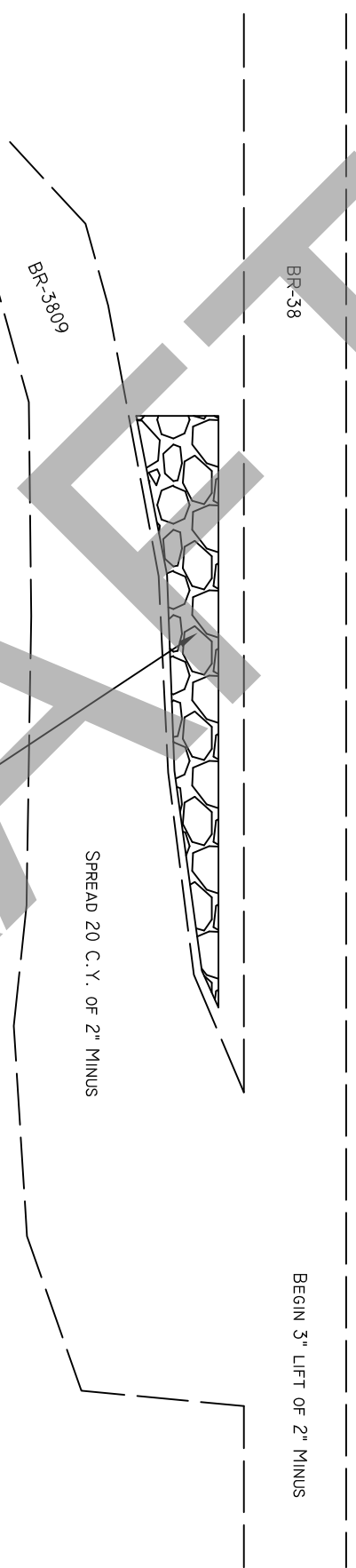


**HEADWALL NOTE:**  
 HEADWALL TO BE CONSTRUCTED OF IMPERVIOUS MATERIAL THAT WILL RESIST EROSION AND ARMORED WITH RIPRAP QUANTITY SPECIFIED IN ROAD PLAN.

CONTRACT # 30-106183	PROJECT GREENSTONE	SHEET 41 OF 45
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BR-38 & BR-3809  
INTERSECTION REPAIR DETAIL

PLAN VIEW



BEGIN 3" LIFT OF 2" MINUS

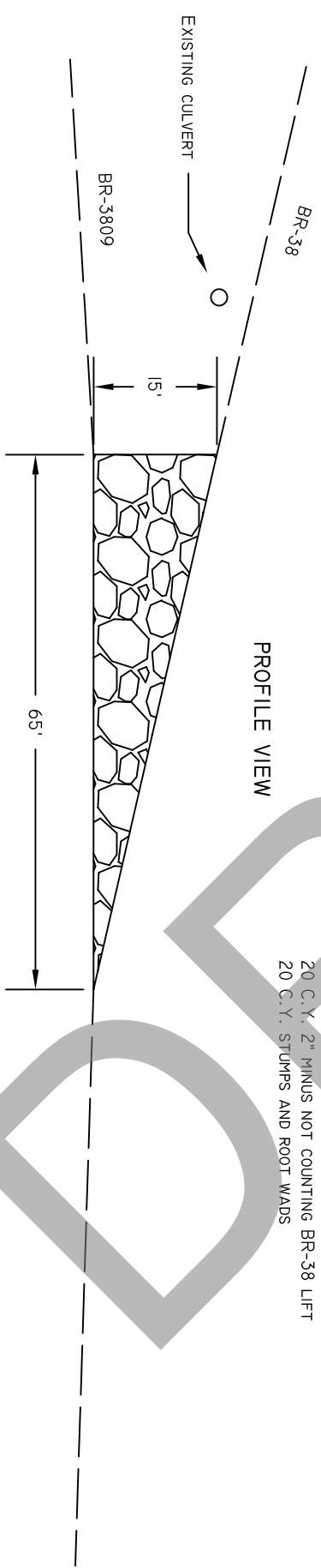
SPREAD 20 C.Y. OF 2" MINUS

- CONSTRUCT ROCK WALL WITH 1 - 2 TON OVERSIZE RIPRAP AT A 1 1/2 : 1 SLOPE RATIO (H:V)
- BOTTOM COURSE TO BE COUNTERSUNK
- BACKFILL WITH SHOTROCK
- CONSTRUCT BERM OF INTERLOCKING STUMPS AND ROOT WADS ALONG TOP EDGE TO DISCOURAGE ORV SHORTCUTTING

TOTALS:

- APPROX. 60 C.Y. OVERSIZE RIPRAP
- APPROX. 40 C.Y. SHOTROCK
- 20 C.Y. 2" MINUS NOT COUNTING BR-38 LIFT
- 20 C.Y. STUMPS AND ROOT WADS

PROFILE VIEW



CONTRACT #	PROJECT	SHEET
30-106183	GREENSTONE	42 OF 45

# PIT DEVELOPMENT PLAN TEMPLATE

## WEST BEAR PIT

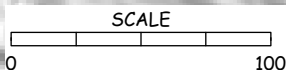


BR-3802-05

STOCKPILE OF 2" MINUS

PURCHASER TO DRILL AND SHOOT  
ENTIRE WESTERN RIND AND  
SOUTEAST BENCH DOWN TO MATCH  
EXISTING PIT FLOOR AND.

LEAVE NO RIND ON SOUTHERN EDGE.



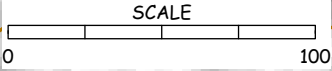
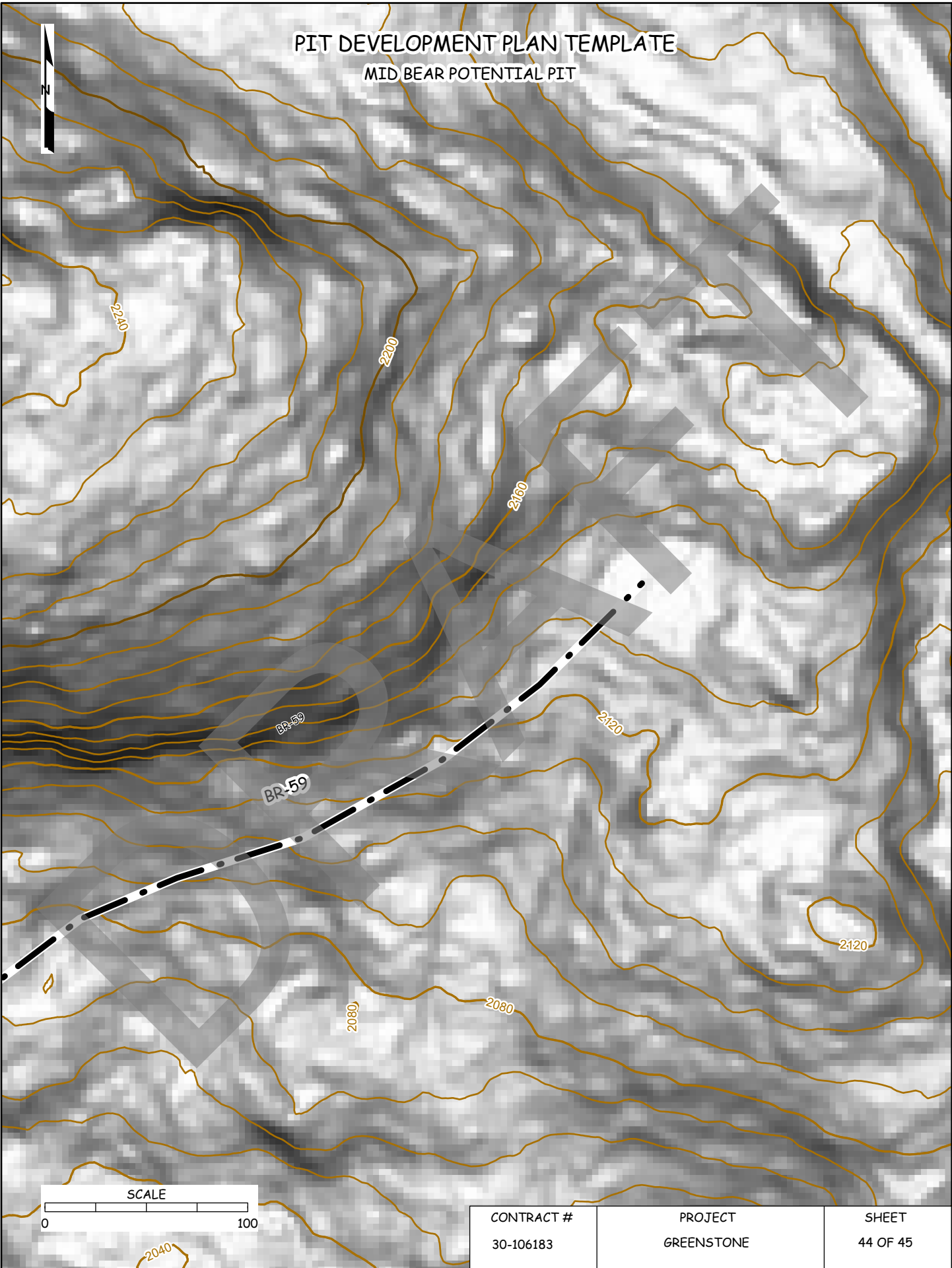
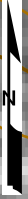
CONTRACT #  
30-106183

PROJECT  
GREENSTONE

SHEET  
43 OF 45

# PIT DEVELOPMENT PLAN TEMPLATE

## MID BEAR POTENTIAL PIT



CONTRACT # 30-106183	PROJECT GREENSTONE	SHEET 44 OF 45
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PIT DEVELOPMENT PLAN TEMPLATE <sup>2520</sup>  
GREENSTONE POTENTIAL PIT

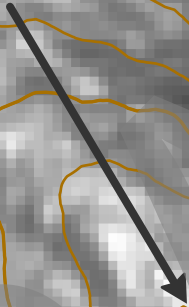


BR-63

BR-6307

PURCHASER MAY DEVELOP ROCK  
PIT TO THE SOUTHWEST.

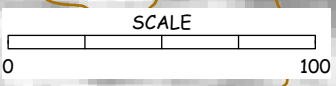
ADEQUATE WIDTH MUST REMAIN  
UNDEVELOPED TO ALLOW ACCESS  
FOR GROUND BASED LOGGING  
EQUIPMENT TO TOP OF KNOB



2440

2500

2500



CONTRACT # 30-106183	PROJECT GREENSTONE	SHEET 45 OF 45
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# SUMMARY - Road Development Costs

REGION: NW

DISTRICT: Clear Lake

SALE/PROJECT NAME: Greenstone

CONTRACT #: 30-106183

ROAD NUMBERS:	BR-3802-15, BR-3823-05, BR-5008, BR-58, BR-5804, BR-58, BR-59, BR-6307, BR-6307-04	BR-3802-15, BR-3823-05, BR-3802-1503, BR-6307, BR-6307-05	BR-ML, BR-38, BR-3802, BR-3802-05, BR-3823 BR-50, BR-63
ROAD STANDARD:	Construction	Reconstruction	Pre-Haul Maintenance
NUMBER OF STATIONS:	116.91	76.11	661.67
CLEARING & GRUBBING:	\$48,358	\$13,158	\$0
EXCAVATION & FILL:	\$128,291	\$37,827	\$0
MISC. MAINTENANCE:	\$0	\$0	\$35,582
ROAD ROCK:	\$272,339	\$71,937	\$17,527
ROCK STOCKPILE PROD:	\$0	\$0	\$0
CULVERTS & FABRIC:	\$72,642	\$23,621	\$3,200
STRUCTURES:	\$0	\$0	\$0
MOBILIZATION:	\$1,814	\$1,814	\$1,556
TOTAL COSTS:	\$523,444	\$148,356	\$57,865
COST PER STATION:	\$4,477	\$1,949	\$87
ROAD DEACTIVATION & ABANDONMENT COSTS:		\$3,856	
<b>TOTAL (All Roads) =</b>			<b>\$733,521</b>
<b>ESTIMATED PRECRUISE SALE VOLUME MBF =</b>			<b>3500</b>
<b>ESTIMATED TOTAL \$/MBF =</b>			<b>\$209.58</b>

Compiled by: J. Westra

Date: 11/20/2023